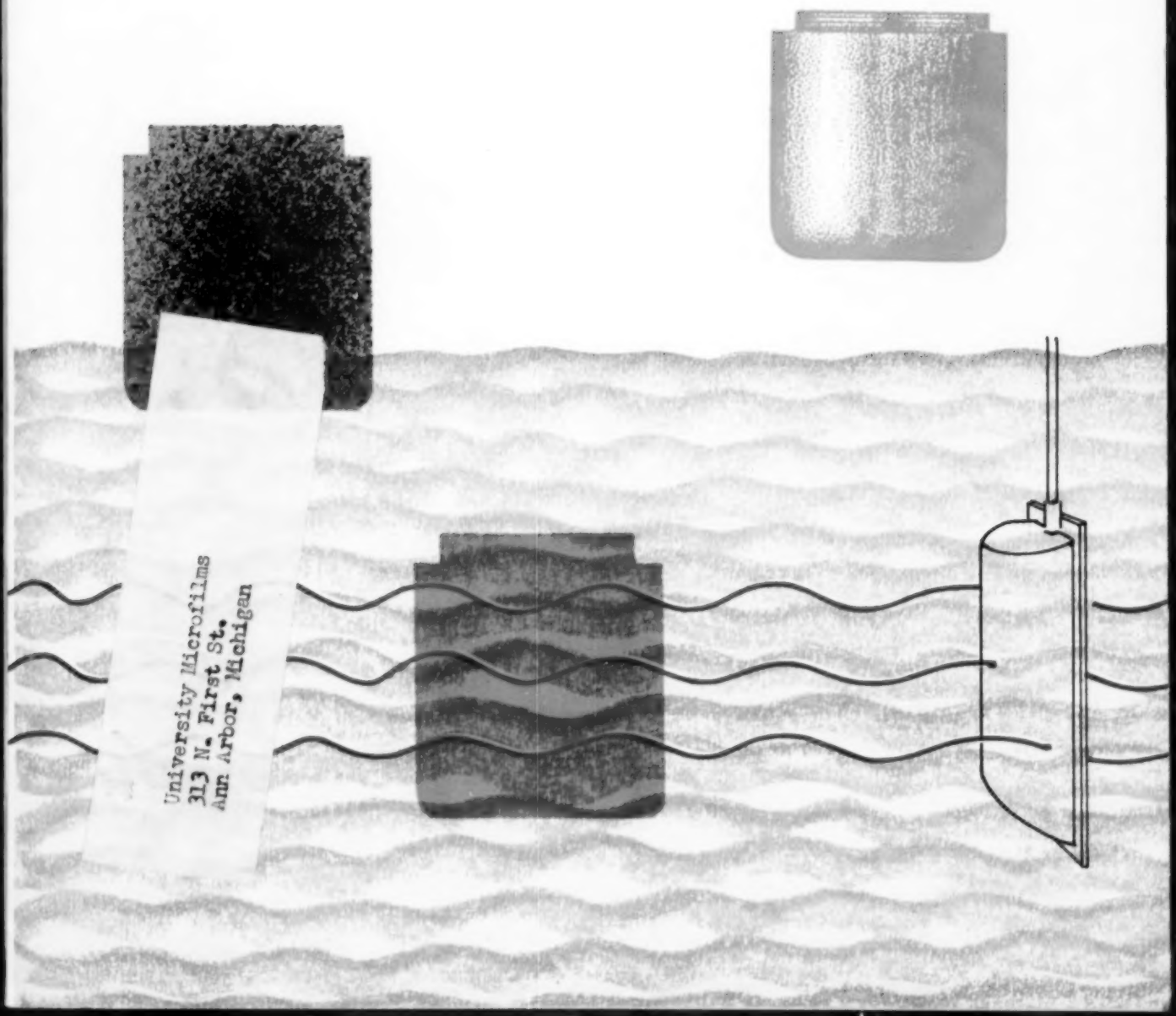
NOVEMBER 1955

plating

JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY



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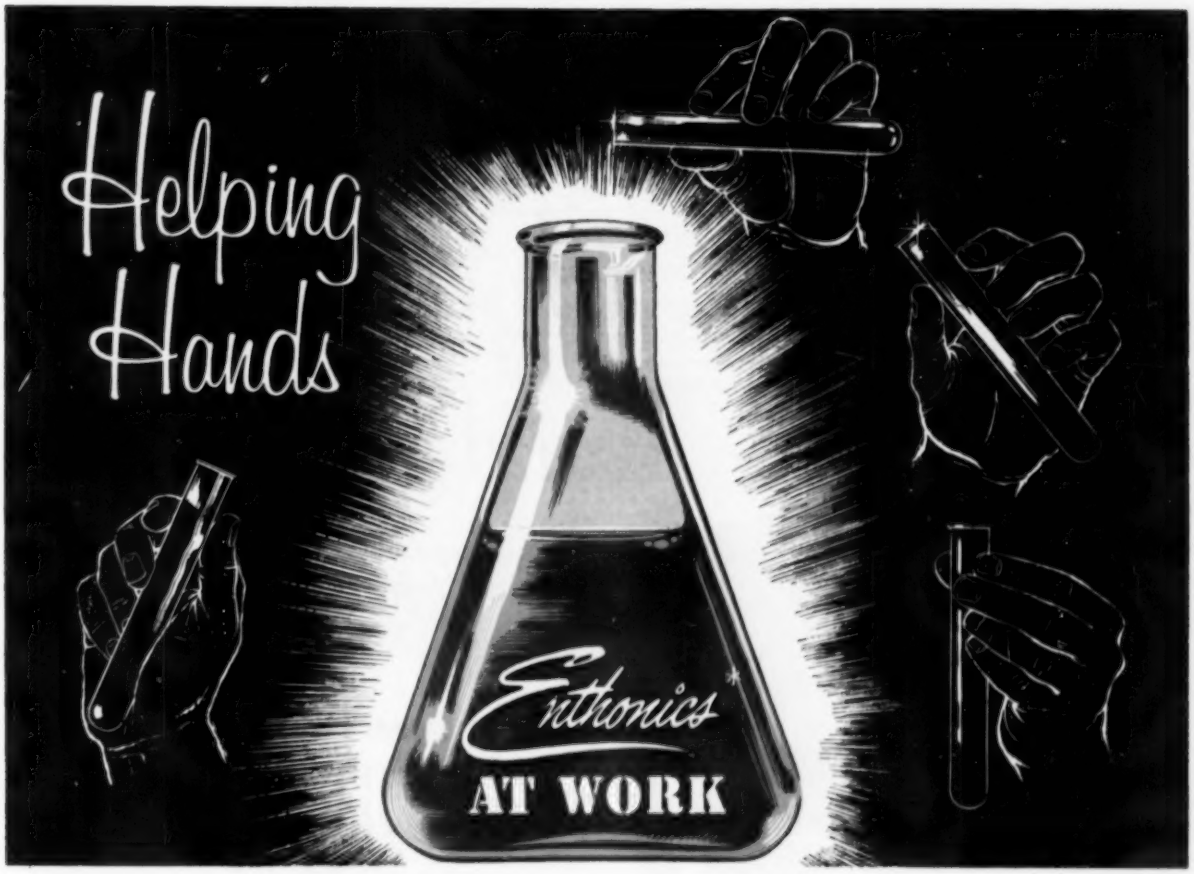

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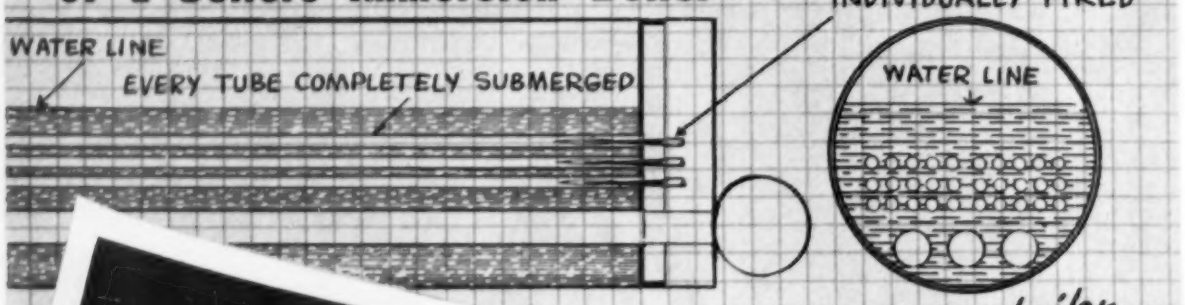
when you buy a steam boiler . . . be sure to look at the picture of a Sellers Immersion Boiler



There's no other boiler like a Sellers—

every square foot of heating surface is water backed— —100% effective!

The long, individually gas fired tubes in the Sellers Immersion Boiler are all completely submerged nearer the water level—and over the return tubes! Heat is therefore uniformly distributed through them—and directly into the water—no where else!

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the average flue gas travel is 15 feet!

Maximum, almost complete utilization of the exhaust heat is assured with a Sellers Immersion Boiler. This is a result of Sellers exclusive design—with the firing tubes completely submerged and *located over the return tubes,* there is a long, slow flue gas travel—an average of 15 feet! Heat can only go into the water.

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An Educational Society for the Advancement of the Science of Electroplating, the Finishing of Metals and Allied Arts

plating

Journal of the American Electroplaters' Society

November 1955 **Vol. 42, No. 11**

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Published by the American Electroplaters' Society, Incorporated, 445 Broad Street, Newark 2, N. J. Phone: HUmboldt 2-3400. Yearly subscription for Members $2.00. Nonmembers U. S. and Canada $5.00, 65c a copy. Foreign, $8.00 a year, $1.00 a copy.

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PLATING is abstracted regularly in Chemical Abstracts, Metals Review, Metallurgical Abstracts, Engineering Index, Technical Data Digest, and Bulletin Analytique.

Statements of fact and of opinion given in articles and papers in PLATING are those of the contributors. The American Electroplaters' Society assumes no responsibility for them.

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Published monthly at 5800 N. Marvine St., Philadelphia 41, Pa. Entered as second class matter July 1, 1946, at the Post Office at Philadelphia, Pa., under Act of August 24, 1916.

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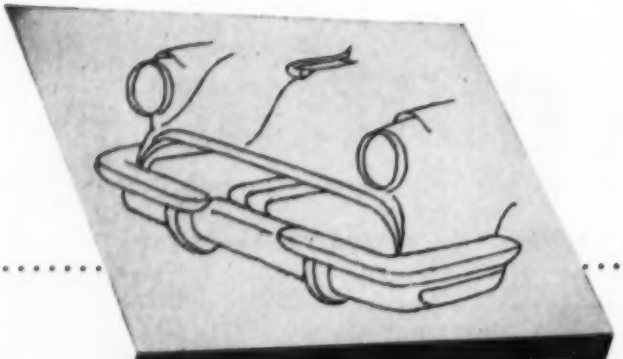
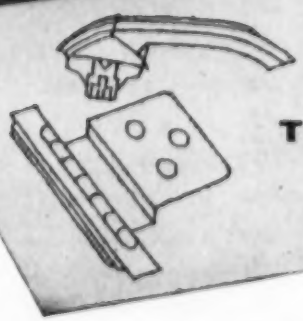


HARSHAW electroplating CHEMICALS and ANODES



nickel plating

. . . still and barrel . . . nickel anodes—all commercial grades and sizes . . anode bags . . . single nickel salts—nickel chloride . . . nickel carbonate . . . nickel fluoborate . . . boric acid.

chromium plating

. . pure "Krome Flake" 99.8% CrO_3. . . sulphates less than .10% . . . lead, tin-lead and antimony-lead anodes.

copper plating

. . . copper ball anodes . . . Rochelle Salts . . . sodium and copper cyanides . . . copper sulfate . . . copper fluoborate.

cadmium plating

. . . ball and cast cadmium anodes . . . cadmium oxide . . . sodium cyanide . . . cadmium fluoborate.

tin plating

. . . cast tin anodes . . . sodium stannate . . . stannous sulfate . . . tin fluoborate . . . acid tin addition agent.

zinc plating

. . . ball and cast zinc anodes . . . sodium and zinc cyanide . . . zinc sulfate . . . zinc fluoborate.

lead plating

. . . cast lead anodes . . . lead fluoborate.

silver plating

. . . silver cyanide.

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Editorial

NEGLECTED TOOL

A few years ago a safety razor company advertised "We can't improve the product so we improved the package." This statement, with all its implications, applies to the advertising and promotion of the manufacturers and suppliers of the finishing industries.

Recently a manufacturer used an advertisement in PLATING announcing a new package that played up several features such as "a no-return carton," "economy packaging," "quick identification." Merchandising is just as important in the metal finishing industries as in any other.

For years manufacturers have been talking to electroplaters about the contents of a bottle or package and completely overlooked the tool at hand—the package—to identify their product at reorder time.

The manufacturer can put himself in a better and more competitive situation simply by maintaining the quality of the product but improving the package. This can be done by 1) Playing up a distinctive new design of bottle or package to make it readily identifiable without close inspection, 2) Make the bottle or carton easily disposable and avoid the "return" nuisance, 3) Pack in cartons that are easily stored and hold small enough assortments to satisfy every need, 4) Enclose a handy reorder form. What more natural means than to use a shipping carton to encourage a repeat order?

Above all, make the product easy to buy and the salesman will find it easier to sell. An attractive container is a valuable help—especially when its identification is insured through advertising.

INDUSTRY NEWS

Top left—Corrugated steel decking is laid. Top right—Wire mesh is laid on steel decking. Bottom left—Perlite-concrete is poured. Bottom right—Four-ply asphalt roof is laid directly on top of perlite-concrete slab

Perlite-Steel Roof Deck Wins One-Hour Fire Rating—Approval by Underwriters Laboratories of a one-hour fire rating for the corrugated-steel perlite concrete roof deck has made available to architects and builders a safer, more economical method of roof construction, the Perlite Institute, New York City, announced. Perlite is a white, exploded volcanic rock aggregate for mixing with cement or plaster. It weighs only 1/12th as much as sand and has unusual insulating and moisture resistant qualities.

Of special interest for school, commercial and industrial applications, Richard S. Funk, the Institute's secretary pointed out, is the fact that the perlite-steel deck requires no inside finish to qualify for the one-hour rating—an important economy factor.

The deck was tested with the under side of the corrugated metal exposed directly to flames. Test lasted an hour and inside temperatures reached 1700°F. The top of the insulating slab, however, never rose above 187°F. Temperature of the protected supporting beams averaged 340°F at the end of the hour's exposure, and calculated "U" factor of the entire assembly, including built-up roofing, was 0.17 Btu/hour/sq ft per degree F. After fire and hose stream tests the deck was double loaded with 80 lb/sq ft with practically no additional deflections being noted.

Nankervis Buys Commercial Research Labs—The George L. Nankervis Company of Detroit, manufacturers of laboratory and production testing equipment for the automotive and aircraft industries, has completed negotiations to purchase the entire assets of the Commercial Research Laboratories, Inc., (also of Detroit) builders of COX instruments, flowmeters and related scientific equipment.

Name of the new company will be Commercial Research Division, George L. Nankervis Company. It will continue to operate with its own personnel under the direction of Claude E. Cox, founder and president. Cox, a pioneer in the development of scientific equipment for the measurement of pressure, flow, and vibration, has headed the company since its establishment in 1912.

Integration of the two companies will follow when new facilities are ready after the first of the year. Announced last month by the Nankervis Company was the purchase of a 75,000 sq ft manufacturing facility, formerly used by American Motors Corporation, which is to be the site for the combined operations.

Acquisition of Commercial Research Laboratories marks the seventh expansion of the Nankervis Company in the past five years.

Sylvania Plans Complete "Out-of-Pile" Fuel Service for Nuclear Reactors—A complete "out-of-pile" fuel service for nuclear reactors has been set as a company goal by Sylvania Electric Products Inc., Stanley B. Roboff, Manager of Industrial Coordination for Sylvania's Atomic Energy Division, announced at the first U. S. Trade Fair of the Atomic Industry.

"We plan to add to our already established fuel-manufacturing program, a program on fuel reprocessing and recovery, so that at the earliest practical date we will be in a position to provide the reactor and power industries of this country with a complete and integrated fuel and reprocessing service," Roboff said.

Roboff went on to say that Sylvania's program is aimed at the removal of "one of the biggest single question marks" associated with the advance of commercial atomic power. "Within the past few months," he noted, "key members of the Atomic Energy Commission staff have repeatedly pointed out that until industry solves the combined problems of spent fuel reprocessing and re-fabrication, economic nuclear power will stay out of reach."

"The entire cycle of fuel manufacture and fuel recovery seems to have been somewhat overlooked in the scramble of a large number of industrial concerns to be the 'first in their block' to build a commercial power reactor," Roboff commented. He pointed out that while major reactor components can be accomplished in existing industrial plants, manufacture and reprocessing of nuclear fuels must take place "in a type of facility which is almost non-existent on the American industrial scene."

Security measures, protective features, and strategic locations of nuclear fuel plants add up to high costs of investment and operation, Roboff said. But investment must be made now in order to gain valuable operating experience, "and promote enough low-cost power reactors so that volume throughput will begin to work in our favor. In other words, we must prime the pump."

Noting that Sylvania has been in the nuclear fuel business for almost ten years, Roboff said that is was recognized that "we are dealing, especially in the field of economical fuel recovery, in a realm which is largely unknown. Yet someone must venture into this area if we are truly to have a nuclear power industry in this country and one which can sustain itself economically."

Roboff spoke at an afternoon session of the Third Annual Forum of the Atomic Industrial Forum, being held here in conjunction with the Atomic Trade Fair. Sylvania is one of more than 70 American industrial exhibitors participating in the Fair at the Sheraton-Park Hotel, September 27-30.

INDUSTRY NEWS BRIEFS

● **Beckman Instruments, Inc.,** has purchased the **Liston-Becker Instrument Co.,** Springdale, Conn.

● Exclusive rights to manufacture radioactive signs in the United States against German patents has been granted to the **Bettinger Corp.,** Waltham, Mass.

● **Carboloy** claims that use of carbide metal as slitters in paper cutting operations will out-perform other knife materials better than 20 to one.

● Some $90 billion worth of industrial machinery has been bought by private industry in the United States in the 10 years since V-J Day, according to a special study made by **C.I.T. Corporation,** industrial financing firm.

● Latest step in **American Potash & Chemical Corporation's** lithium plans is the formation of a new company, **American Lithium Chemicals, Inc.,** for which a $6,600,000 production plant is under construction near San Antonio, Texas, to produce lithium hydroxide. The plant will be completed, according to schedule, late this year.

● Formation of **Portomag Sales, Inc.** is announced by *R. S. Ebbert* and *R. R. McLeese.* The new organization will handle both national and foreign sales and service of Portomag units, the new portable magnetic-drill press manufactured by **Lupear's Tool and Die Co.** of Farmington, Michigan.

● *John L. Ledman,* Chicago, a sophomore, has been awarded the American Society for Metals $400 tuition scholarship at Illinois Institute of Technology.

● A multi-million dollar expansion program that will result in a 40 per cent increase in automotive chassis frame production capacity is announced for the **Parish Pressed Steel Division** plant of **Dana Corporation.** The expansion will involve construction of two additions to the present plant, one 560 feet long by 180 feet wide, and another 180 feet long by 90 feet wide.

● A $500,000 expansion of the testing facilities of the **General Electric Company's Switchgear and Control Divisions' laboratories** has been completed. The new facility will help to further improve the quality and value of the company's direct current switching devices such as circuit breakers and contactors.

● *Edward P. Schinman,* president of **Bogue Electric Manufacturing Co.,** Paterson, New Jersey, was named recipient of the 1955 Air Power Trophy, highest honor awarded by the **Air Force Association New Jersey Wing.** Also presented high honors are the **Allen B. DuMont Laboratories, Stroukoff Aircraft Corporation** and **Reaction Motors Inc.,** which were presented with Air Power Achievement Awards for their outstanding contributions to air power during 1955. In addition, a Certificate of Merit Award was made to *William F. Kaiser* of **Curtiss-Wright Corporation.**

● **Dow Chemical Company** has ordered a 50,000-kilowatt steam turbine-generator from the **General Electric Company** for its Freeport, Texas plant, which produces magnesium extracted from seawater and a variety of other inorganic and organic chemicals. The unit will be used to produce both process steam and power.

● **The Manderscheid Co.** moved on Oct. 1 from its old quarters on Fulton St. in Chicago, to 210 So. Clinton St., Chicago 6, Ill.

FOR BETTER BRASS PLATING

●

Most of us remember our mothers or grandmothers working during the summer and fall canning vegetables and fruits and putting up meats for use during the winter and spring. Some people began to buy canned foods despite the joke about the practice and today very few people take the time to put up food in their own cans preferring to let the large packing houses do the job.

●

Making up and maintaining brass solutions is about the same thing. Until True Brite pioneered ready made Brass Solutions for making up and maintaining the solutions, platers made their own solutions from the basic chemicals. Just as home packed foods sometimes spoil and don't always taste the same these brass solutions depended on the skill of the person operating them and even then were not always uniform in quality and color.

●

True Brite offers both Makeup and Maintenance Brass Solutions which eliminate the variations in color and enable unskilled men to operate with only occasional check for ingredients.

●

As manufacturers of copper and zinc cyanides, this package costs you little, if any, extra. Special analysis methods easily performed by any chemist, and accurate and reproducible, are available on request. Composition limits are clearly defined and will give uniform results.

●

The old home packed foods always tasted better to some people so no plater need be ashamed of his old home packed brass solution. It may be better than anything we can put up in a drum. If you like the new-fangled cans, write for our technical bulletin. Of course, we can maintain your present brass solution by just adjusting composition to our limits.

TRUE BRITE CHEMICAL PRODUCTS CO.
BOX 31C OAKVILLE, CONN.

INDUSTRY NEWS

"Research for Profit" will be the theme of an industrial research conference sponsored by Armour Research Foundation of Illinois Institute of Technology, Chicago, on April 18-20, 1956.

The meeting, titled the National Industrial Research Conference, will highlight a series of 12 technical meetings planned as part of the Foundation's 20th anniversary in 1956.

A number of leading industrialists and research directors will participate in the three-day program designed to guide industry in the administration of more profitable research.

Twelve papers will be presented at the conference, which will be held on the Illinois Tech campus.

Republic to Brazil—Republic Gear Co. announced today the licensing of a Brazilian firm to manufacture its full list of automotive products.

Herbert S. Ries, president, said that the agreement with Maquinas York, of Sao Paulo, Brazil, covers all products of Detroit Bevel Gear Co., and also the Rzeppa Universal Joint, a product of Gear Grinding Machine Co., of Detroit, parent company of Republic Gear. It is the first such arrangement made by Republic in South America.

Lithium Corporation Announces Dividend—Lithium Corporation of America, Inc. announces an initial stock dividend of 5 per cent payable December 1, 1955 to stockholders of record November 1, 1955. Scrip certificates will be paid in lieu of fractional shares.

Sack of silver

Old Timers Get the Sack—Nick Sax, left, and Helen Lageose, right, are among employees of American Buff Company who celebrated at a birthday party held at the company's Chicago plant on September 15th. Marking the 20th Anniversary of the firm's founding, president Ben P. Sax, center, awarded each employee of the Chicago plant a sack containing twenty silver dollars. The trio shown cutting the birthday cake have dedicated a total of sixty years' service to American Buff Company. Frosting on the candle-bedecked cake was designed as a giant multicolored buffing wheel. Bank messengers delivered the silver "cartwheels" in an armoured truck when paying their "surprise visit" to the plant.

Hamilton Associates to Represent American Agile Corp.—Hamilton Associates, Indianapolis, has been appointed representative for the American Agile Corporation, Maple Heights (Cleveland), Ohio, according to an announcement by Carl F. Freedman, Agile executive vice president and general manager.

Hamilton Associates, which is headed by Byrl E. Hamilton, will cover a territory consisting of the state of Indiana and the northern portion of Kentucky.

New Contract for Uranium Plant—Hewitt-Robins, Inc. has received a contract to install a series of conveyors and allied equipment in a new uranium plant currently under construction at Tuba City, Arizona, the first uranium processing plant in the state.

The conveyors will haul uranium ore from outside storage areas into the plant, where the element known as U308 is extracted. The extracted material will then be shipped to U.S. atomic energy plants for further processing.

The Arizona plant is owned by the Rare Metals Corporation of America, which in turn is owned jointly by the El Paso National Gas Company and the Western National Gas Company.

Rubber belting for the conveyors will be made at the Hewitt-Robins plant in Buffalo. Machinery required to support and drive the conveyors will be made in the company's plants in Passaic, N. J., and Chicago.

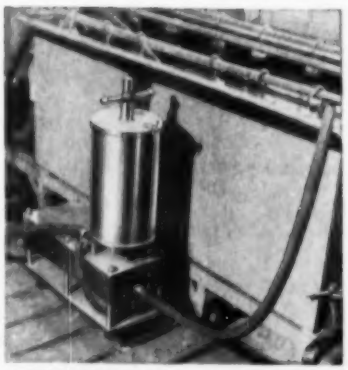
LOOK

No Rejects

NO pitting, spotting, or reworking . . . . . .

Impurities—primary cause of pitting, spotting, rejected finished work—are positively eliminated by the Alsop "Sealed-Disc" Filter. That's because they're designed for Platers—to meet plating room requirements. That's why they're compact, portable—smaller than conventional filters—save valuable space—yet capable of handling equal volumes of solutions.

Simplicity of design cuts operating time and labor—means savings for you. Check its many additional proved performance features and know why more platers depend on "Sealed-Disc" Filters. Ask your regular plating supplier—or write for details.



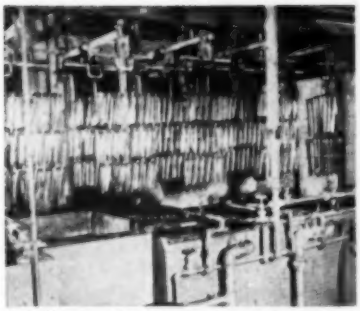
"Sealed-Disc" Filters remove more impurities with less effort and in less time. Use it on your acid dips, electro cleaners, and solvents too.

ALSOP ENGINEERING CORPORATION

Positive Filtration

FIRST STEP IN CUTTING COSTS

1011 FINE STREET • MILLDALE, CONNECTICUT



Full automatic elevator-type conveyor

Nickel Plate With a Snap—Conversion to bright nickel plating has paid off handsomely at the S. E. & M. Vernon Co., Elizabeth, N. J., one of the nation's largest manufacturers of looseleaf binders and folders.

Besides turning out a glittering binder ring that quickly became the choice of stationery dealers and consumers, the company's new bright nickel processing is plating work 20 per cent faster, using 50 per cent less amperage and 25 per cent less nickel. In addition, the process (a development of Hanson-Van Winkle-Munning Co., Matawan, N. J.) has cut purification, heat, power operating and maintenance costs because of its higher stability and lower operating temperature.

Looseleaf binder rings are shown in the attached photo after coming out of the nickel-plating bath on the far left and receiving this bright protective coating. This H-VM-M full-automatic elevator-type conveyor is pictured during a transfer cycle with racks in the up-position. When the transfer period is completed, the racks in the center of the picture will be situated directly above rinsing tanks. The conveyor carrier arms will then lower the work into the baths. Racks on the far right are shown going through a dryer. Carrier arms here remain in an up-position during this operation.

Brush Appoints Five New Reps.—The appointment of six new representatives to handle its Surfindicator and accessories has been announced by the Brush Electronics Company, Cleveland. The Surfindicator is a precision instrument for measuring surface roughness; attachments and accessories have been engineered for increasing the use of surface finish control at the production machine. Proper use of surface finish control permits reduced costs, increased production and more uniform product.

Dolph Boettler and Company, St. Louis, will cover a territory including the state of Missouri, east of and including Schuyler, Adair, Macon, Randolph, Boone and Moniteau counties and south of and including Morgan, Benton, Henry and Bates counties, except Jasper and Newton counties. In addition, the firm will represent the Brush Surfindicator in Madison and St. Clair counties in Illinois.

Claude Mann and Associates, Wichita, Kansas has been appointed to cover the state of Oklahoma, plus the state of Kansas south of and including Hamilton, Kearny, Finney, Hodgeman, Pawnee, Stafford, Reno, Harvey, Butler, Greenwood, Woodson, Allen and Bourbon counties. It will also serve the counties of Jasper and Newton in Missouri.

Glade Ives, Kansas City, Missouri has been appointed by Brush to cover a territory including the state of Nebraska and the state of Kansas north of and including the counties of Greeley, Wichita, Scott, Lane, Ness, Rush, Barton, Rice, McPherson, Marion, Chase, Lyon, Coffey, Anderson and Linn. He will also represent Brush for its Surfindicator line in the state of Missouri west of and including the counties of Putnam, Sullivan, Linn, Chariton, Howard and Cooper and north of and including the counties of Pettis, Johnson and Cass.

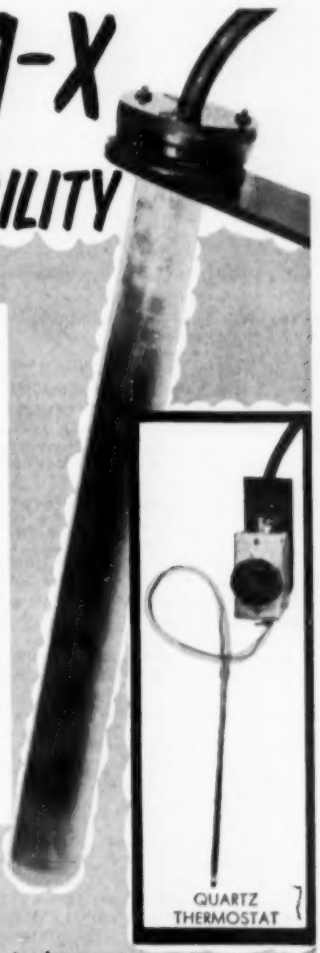
Engineering Sales Company, Houston, will cover the state of Texas.

Wepfer Engineering Sales Company, Memphis has been appointed to represent the Surfindicator line in the states of Louisiana, Mississippi and the state of Tennessee west of and including the counties of Henry, Benton, Decatur, and the western portion of Hardin county bounded on the east by the Tennessee River.

Argost, Frost & Grant, Inc., New York, N. Y. will cover a territory in the state of New York including the counties of Columbia, Green, Ulster, Sullivan, Dutchess, Putnam, Orange, Westchester, Suffolk and Nassau only, and the five Boroughs that comprise the city of New York. They also will represent the Surfindicator line in the state of New Jersey north and east of and including the counties of Monmouth, Middlesex, Somerset, Morris and Sussex.

new THERM-X

QUARTZ IMMERSION HEATER FOR RUGGED DEPENDABILITY



Here is an immersion heater with all of the plus features. Constructed with a pure fused quartz shell, it is chemically inert from practically all solvents.

The "THERM-X" heater is available in lengths from 10" to 72", from 100 to 10,000 watts and 115, 230 and 440 volts. Heater supports and protection tubes are also available. Put these newly developed heaters to work for you and be SURE you are using the finest.

"SNAP-ACTION" QUARTZ THERMOSTAT
For Control of Corrosive Liquids and Gases

An outstanding development in heat control. Immune to chemical attack but extremely sensitive to temperature. Finger tip control by adjusting simple dial.

RATING: 22 Amperes at 120-240 volts.
Capillary tubing length 36"

Send today for descriptive literature.

Manufacturers of a complete line of immersion heaters.

N. J. THERMEX COMPANY, INC.
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Available for Immediate Shipment, Attractive Values

THE FOLLOWING EXCELLENT REBUILT AND GUARANTEED ELECTROPLATING MOTOR GENERATOR SETS AND RECTIFIERS, WITH FULL CONTROL EQUIPMENT:

PLATERS

1—7500/3750 AMPERE, 9/18 VOLT, **HANSON-VAN WINKLE-MUNNING**, Synchronous.
1—6000/3000 AMPERE, 6/12 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.
1—5000/2500 AMPERE, 6/12 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.
1—4000/2000 AMPERE, 6/12 VOLT, **CHANDEYSSON**, 25° C., Exciter-in-head.
1—3000/1500 AMPERE, 6/12 VOLT, **COLUMBIA**, Synchronous.
1—2500/1250 AMPERE, 9/18 VOLT, **ELECTRIC PRODUCTS**, Synchronous, Exciter-in-head.
1—2000/1000 AMPERE, 9/18 VOLT, **ELECTRIC PRODUCTS**.
1—1500/750 AMPERE, 6/12 VOLT, **HANSON-VAN WINKLE-MUNNING**, Synchronous, Exciter-in-head.
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1—1000/500 AMPERE, 6/12 VOLT, **ELECTRIC PRODUCTS**.

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1—1000 AMPERE, 30 VOLT, **IDEAL**, Exciter-in-head.
1—750 AMPERE, 60 VOLT, **HANSON-VAN WINKLE-MUNNING**, Synchronous, Exciter-in-head.
1—500 AMPERE, 25 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.
1—400 AMPERE, 40 VOLT, **M.G.C.**, Exciter-in-head.

RECTIFIERS

1—2000/1000 AMPERE, 6/12 VOLT, **G. E.**, COPPER OXIDE, with Manual Control.
1—2000/1000 AMPERE, 6/12 VOLT, **G. E.**, brand new selenium stacks, with "On-load" Automatic Voltage Regulator.
1—**GREEN SELECTOPLATER**, 1800 AMPERE, 12 VOLT, 220/3/60.
2—**UDYLITE-MALLORY**, 1500/750 AMPERE, 6/12 VOLT, Control.

SPECIAL

1—20' x 4' x 3' H-VW-M Semi-Automatic for nickel.
1—H-VW-M Full-Automatic Plating Machine, 87' long, 39" lift, was used for copper and nickel.
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1—H-VW-M Full-Automatic Plating Machine, 40' long, 39" lift, was used for cleaning.
1—Production Pipe Polishing Machine, Model 101, Motorized.
2—**RONCI** Enamelers, No. R-100, and No. R-200.
1—**K-4** SEMI-AUTOMATIC BUFFING MACHINE.
3—**U. S.** ELEC. TOOL, Mod. 110, TWIN 15HP POLISHING LATHES.
1—MODEL "A" PRESSURE BLAST.

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INDUSTRY NEWS

Rheem Expands—A broad expansion of its automotive division, geared to meet present and future requirements of the automobile industry, was revealed as Rheem Manufacturing Company announced the acquisition of a 59-acre site and plans for a new plant in Fullerton, California. The decision to expand Rheem's interests in the automotive parts field was disclosed by W. S. Rheem II, vice president and general manager, who said the new facility and equipment will represent an added investment in excess of $6,500,000.

The property was purchased by Rheem Acceptance Corporation, an affiliate of the parent organization, and will be leased to Rheem Automotive Company, formerly known as U. S. Spring & Bumper Company.

Rheem acquired U. S. Spring & Bumper as its automotive division in April, 1954. The division now operates from a plant in the Vernon industrial district of Los Angeles and is a leading producer of springs and bumpers, Silver Line farm tools and Rheem-beam highway guard rail.

Construction will start immediately and the facility will be operating within seven months.

Wiese on Atoms For Peace—The Atoms For Peace program promises no quick profits for industry but a long-term investment in a field of great promise, vice-president J. Frederic Wiese of Lukens Steel Company told the world's first Atomic Trade Fair recently.

Speaking for the steel industry and all other producers of so-called standard commodities, Wiese predicted that the entrance of American business into the atomic picture would bring advances that would "dwarf even the wondrous progress of the last 15 years."

Persons closely associated with nuclear development described Wiese's remarks as significant because it marked the first real economic approach to the subject by a practical businessman charged with the responsibility of operating profitably.

"Businessmen not previously engaged in undertakings related to atomic energy development quite properly will ask about the economic hazard and risk," Wiese said. "A sounder point of view . . . is that it brings with it normal commercial hazards, for those who wish to participate.

"One might add that it may also offer hazards to others who do not participate. For a business that refuses to take risks may some day find itself left far behind its competitors."

Unlocking the hitherto guarded doors for commercial development of the atom for peaceful purposes, he said, offers industry one of its greatest challenges. His own studies and investigations, Wiese said, lead him to believe that these seven basic points must be prime considerations:

1. The door now is wide open to any corporation that wants a part in our great job of putting atomic energy economically to work for human progress.

2. Knowledge amassed by the Atomic Energy Commission can be had for the asking—by almost anyone qualified to understand it.

3. No bonanza is expected . . . in the commercial development of nuclear energy. A willingness to undertake long-term investment is one of the essentials for corporate enterprise equipped to enter this field.

4. The hazards seem no greater than in any other kind of commercial venture, in an area full of present uncertainty but great promise.

5. The problems facing industry in this field differ little in essential character from the problems we have been handling with success year after year, in the economic development and use of our resources.

6. Learning from each other and collaborating with each other . . . is one way to rapid progress in unlocking the secrets of nuclear energy and atomic power.

7. The ultimate rewards . . . promise to be great and epochal, beyond any precedent in our history."

Briefly tracing the 15-year atomic development history, Wiese said that it was carried on under such proper security restrictions that many subcontractors played important parts in programs such as the Manhattan project without the faintest conception of the overall.

AES SUSTAINING MEMBERSHIP PROGRAM

Three more progressive firms have joined the AES Research effort through the important medium of the Sustaining Membership program. The new firms are:

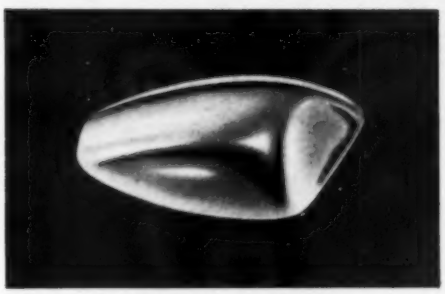
Firm and City	Branch Credit
North American Aviation, Inc. Los Angeles, Calif.	Los Angeles
Nutmeg Chrome Corp. West Hartford, Conn.	Hartford
Edwin L. Wiegand Co. Pittsburgh, Pa.	Pittsburgh

Number of Sustaining Members supporting AES Research through this month 315

Number of Sustaining Members supporting AES Research through last month 312

PRODUCT OF
3M
RESEARCH

New HONITE "Micro Cut" Compound gives super smooth finishes on zinc and aluminum die castings!



Use HONITE "Micro Cut" Compound for Mirror Finish on Stainless Steel

On stainless, new "Micro Cut" Compound mirror finishes without darkening, preserving the metal's bright natural color. Impingement control prevents scratches and nicks—corner break is generated with NO dimension change.

Yes, now you can put a super smooth finish on zinc or aluminum die castings. New HONITE Brand "Micro Cut" Compound contains a brand-new, superfine, natural abrasive (exclusive with HONITE) which assures a smooth finish on every die casting. And HONITE "Micro Cut" Compound can cut the "extra steps" from your barrel finishing operation, too. You can eliminate extra rinsing . . . extra coloring . . . extra labor!

HERE'S HOW! On zinc or aluminum die castings, HONITE "Micro Cut" Compound gently and quickly polishes out surface imperfections without "skinning" or exposing porosity—*and* reduces impingement or nicking, because it holds the parts firmly in the chip mass during the run. You get a quality surface for quality plating on zinc die castings . . . a super smooth surface on aluminum die castings . . . with no need for extra rinsing or coloring!

Write today for a demonstration in your plant of HONITE "Micro Cut" Compound.

Honite BRAND

MINNESOTA MINING & MFG. CO.
DEPT. FC-115, ST. PAUL 6, MINN.

☐ Yes, I'd like a demonstration of HONITE "Micro Cut" Compound.

☐ Send me free copy of booklet: "Facts and Figures Report on HONITE Barrel Finishing", which contains complete information about HONITE barrel finishing compounds.

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City..... Zone..... State.....

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City. Makers of "SCOTCH" Brand Pressure-Sensitive Tapes, "SCOTCH" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

INDUSTRY NEWS

New air conditioned warehouse

25th Year for Michigan Buff Co.—Alfred W. Payson, founder and president of the Michigan Buff Co., announced the silver anniversary of the firm.

On September 21, 1930, the company started with one salesman and a small office. Today, the company employs eleven salesmen and several service engineers—six of which have been with the firm 24 years.

The company occupies a modern air-conditioned warehouse of approximately 17,000 square feet at Detroit. It also maintains warehouses in Chicago, Cleveland and sales offices in New York City and Bridgeport, Conn.

The Detroit home office staff includes Oliver J. Horsch, general sales manager and August J. Becker, Jr., plant superintendent. The Chicago office, for the past 17 years, has been under the management of O. R. Herbert and Milton Johnson. The Cleveland manager is Dennis Durbin; C. G. Dinallo in New York and Don Gaines at Bridgeport.

The rapidly expanding corporation distributes and handles buffing, polishing wheels and abrasive belts of every size and description, as well as countless other items needed by the automotive and metal finishing trades.

Klem Opens West Coast Plant—T. Curtis McKenzie, President of Klem Chemicals, Inc. of Dearborn, Michigan, announces the opening of Klem Chemicals, Inc. of California, located at El Monte, California and the appointment of Jack Borkman as General Manager.

The new plant is fully equipped to handle all West Coast production of both liquid and powder metal cleaning, rust removing, phosphate coatings, paint removing and spray booth compounds. It also has complete laboratory facilities for maintaining service on all commercial problems.

Borkman has been established for many years in the metal cleaning field on the West Coast and is associated with McKenzie in this new plant.

Walworth Acquires Southwest Fabricating and Welding—Acquisition by the Walworth Company of the assets and business of the Southwest Fabricating & Welding Co., Inc., Houston, Texas, one of the leading pipe fabricating companies in the United States was announced.

Fred W. Belz, president of Walworth, 113-year-old manufacturer of valves and pipe fittings, said the acquisition would be based on an exchange of Walworth common stock for the Southwest Fabricating Company. He added that final details as to the number of shares of Walworth stock to be issued to Southwest Fabricating will be determined upon completion of final audit of the business.

Southwest Fabricating supplies important markets throughout the world in the oil, chemical, petro-chemical and natural gas fields. Belz said Southwest will be operated as a subsidiary of Walworth, retaining present management and employees and continuing present policy.

Walworth, with sales in excess of $42,000,000 annually, recently completed the acquisition of the M & H Valve and Fittings Company, a leading manufacturer of water works valves and fittings, as part of its expansion and diversification.

Walworth operates plants at Anniston, Ala.; Boston, Mass.; East St. Louis, Ill.; Greensburg, Pa.; Kewanee, Ill.; and Mineola, Long Island.

Here's the Polarizer YOU asked us for!

Low cost — completely portable, yet it does everything you need!

Two years ago we brought out polarizers for electro-platers to use in making rapid, accurate analyses of their plating solutions. As we told you at the time . . .

The C-1 Gave You FULLY ADVANCED Research-Control . . . because we developed it out of our own long experience as contract and production platers, and because test models had been very well received by large plating concerns.

But You Told Us It Gave You Far MORE Than You Needed When we talked to you—the plating men on the firing line—you told us you didn't need expensive additional research features. You needed a small, self-contained instrument to tell you the exact metallic content of your plating solutions.

So Here's the Patwin C-2—Just What YOU Asked For! In two steps you get the answer: take the current reading on the microammeter; read the analysis on the scale in the Patwin "Cook-Book" Manual. It takes only a couple of minutes; there are no complications.

No Connections Needed! It's Entirely Self-Contained! This new Patwin C-2 Polarizer doesn't have to be plugged in! It runs on three 1½-volt Burgess batteries. Its range is: 0-10-20-30-50-100 microamperes full scale. The sensitivity on direct reading is .1 microampere. Case is 14" x 8" x 8", and is finished in gray hammertone finish on steel—bonderized and primed. For full details, send in the coupon today!

The Patent Button Company **Waterbury 20, Conn.**

PATWIN INSTRUMENTS Division
THE PATENT BUTTON COMPANY, WATERBURY 20, CONNECTICUT
Please send me full information on your new Patwin C-2 Portable Polarizer.

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BEFORE YOU SAY "WE DON'T NEED IT"
LOOK INTO ALL THE ADVANTAGES OF
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FOR ZINC PLATING

- ☐ ROHCO 100 BARREL ZINC BRIGHTENER for brilliant deposits, maximum coverage and lowest cost.
- ☐ ROHCO 303 STILL ZINC BRIGHTENER for highest luster zinc, used with or without conversion or bright dips.
- ☐ Perma-Brite BARREL ZINC BRIGHTENER for economical bright zinc plating. Deposits not quite so bluish as ROHCO 100.
- ☐ Perma-Brite STILL ZINC BRIGHTENER outstanding in lowest cost for large volume solutions; stable in the bath, completely soluble —added directly to the tank. The answer to automatic zinc plating. Easily used for conversion or bright dips.
- ☐ ROHCO ZINC PURIFIER to keep baths in tip-top shape.

FOR CADMIUM PLATING

- ☐ ROHCO 20XL (Liquid or Powder) gives brightest cadmium; minimizes cadmium consumption by improving uniformity of deposit.
- ☐ AIRCRAFT BLACK CADMIUM PROCESS for adherent, attractive blackening of cadmium.

FOR CHROMIUM PLATING

- ☐ ROHCO NO-CRO-MIST® the original additive to safeguard worker's health by eliminating chrome fumes, solves ventilating and heating problems; saves chromic acid.
- ☐ CHROMETER—a special hydrometer which gives direct chromic acid content at the bath operating temperature.
- ☐ HULL CELLS AND RECTIFIERS for speedy, positive catalyst control.

FOR ALL PLATING

- ☐ HULL CELL UNITS of lucite, solid-wall porcelain and molded polythene. New Model "WT" or "WT1000" with immersion heater and built-in thermostat; electric Hull Cell Agitator.
- ☐ HANGING HULL CELL is a novel device for making plating tests under production conditions. Indispensable for checking each operation in a plating cycle.
- ☐ HULL CELL ANODES: cast of various metals.
- ☐ HULL CELL CATHODES: zinc plated steel, No. 3 finish; or polished brass with peelable protective coating.
- ☐ SMALL PLATING RECTIFIERS for Hull Cell Tests and experimental plating: Models B267, B500, B1000, B1500 with capacities ranging from 5 to 50 amperes at adequate voltage for all plating.
- ☐ ROHCO CURRENTESTER enables platers to detect and correct the hidden troubles of rectifiers that ordinary meters don't indicate. New Model C-2, compact, attractively priced.
- ☐ ROHCO RINS-AID sheds water; improves drying; prevents staining.

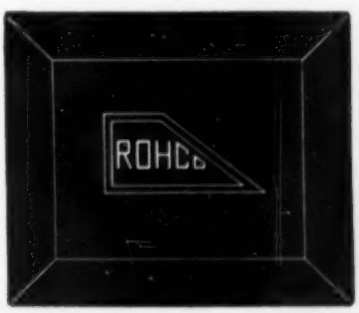
R. O. HULL & COMPANY, Inc.

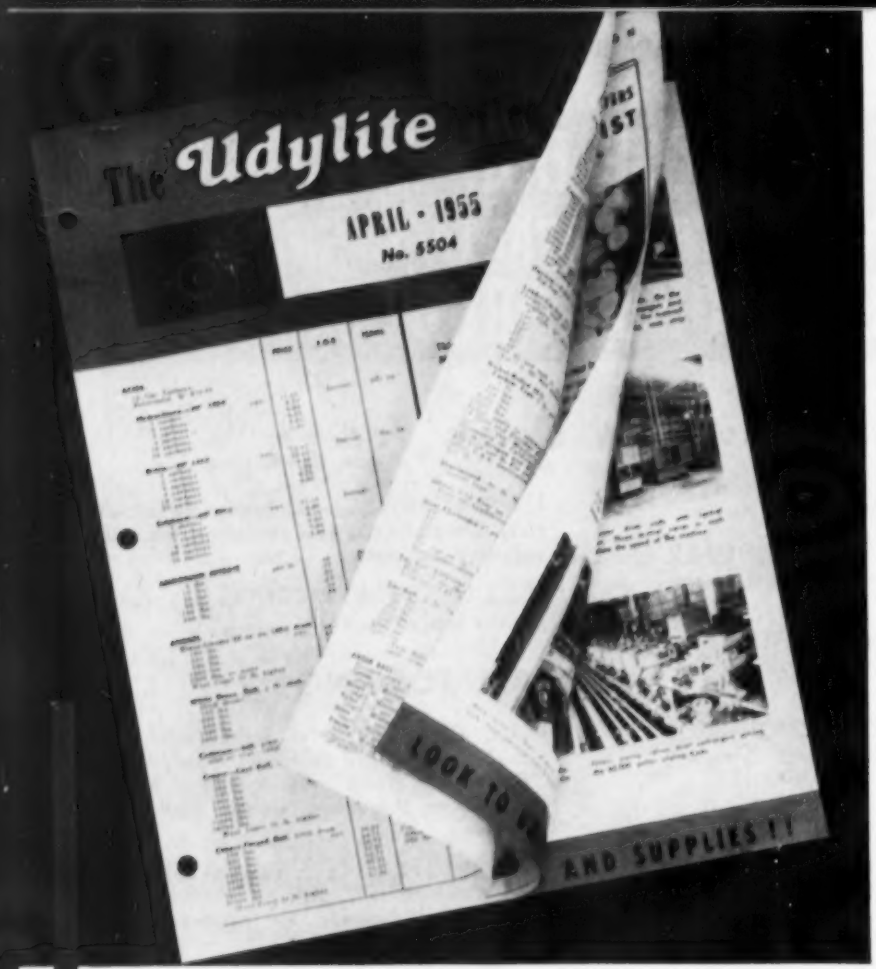
1302 Parsons Court Rocky River 16, Ohio

Canada: Armalite Company, Ltd.

Toronto 6, Canada

"THE HULL CELL TEST MAKES PLATING BEST"





THIS SERVICE WAS DESIGNED FOR YOU

A lot of profits can roll out the back door of your plating shop if you fail to keep up-to-date on prices of the hundreds of items you use every day. That is why Udylite, as another of its many free services to electroplaters, publishes the Price Guide—a monthly price listing of important items regularly used by the trade, as well as information about new developments in equipment and processes.

It pays to buy supplies from Udylite—you can be sure of top quality, accurate weight and pricing—that Udylite stands back of every sale. You can be sure of prompt delivery too, as Udylite has widespread warehousing service.

The Udylite Price Guide has become an important tool for thousands of electroplaters. If you are not receiving your copy now, send us your name and address and it will soon reach your desk on the first of each month.

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

WORLD'S LARGEST PLATING SUPPLIER

INDUSTRY NEWS

New facilities

New Plant for Pelron—Pelron Corporation officially occupied their new office, laboratory, and manufacturing plant on September 1, at Lyons, Illinois.

Paul E. Pelletier, president, reports that the new laboratory facilities will enable Pelron Corporation to continue to greatly expand its research and product development program. The new factory consists of the most modern chemical handling equipment and storage facilities. The expansion of laboratory and production facilities will enable the Corporation to manufacture new chemicals and compounds, in addition to their regular line of products which includes phosphating compounds, cutting oils, paint strippers, resins, core oils and rust preventives.

Pelletier further stated that even though the Corporation's entire factory and offices were wiped out by fire in 1954, the company was able to resume business, using emergency facilities, immediately after the fire, and continued to supply its customers during the period of reconstruction. He said, "The spirit of assistance and cooperation among employees, customers, and friends was most gratifying and enabled the company to carry on business almost as usual during the period of reconstruction. This same spirit should most certainly be an incentive to the Corporation in carrying on its policy of growth and service to its customers."

Chemclean vs Time Chemical—Action has been instituted in the Supreme Court of the State of New York, Kings County by Sidney Livingston, principal stockholder of Chemclean Products Corp. and Silver Star Chemical Corp. of Brooklyn, New York, and the two corporations, for $100,000.00 for damages against Time Chemical Corp. of Yonkers, New York and Lionel De Waltoff and Lawrence Handel, a former stockholder and former employee, respectively of Chemclean Products Corp. and Silver Star Chemical Corp.

The complaint alleges that Lionel De Waltoff and Lawrence Handel, while associated with Chemclean Products Corp. and Silver Star Chemical, Corp. conspired to organize Time Chemical Corp. to destroy the business of Chemclean Products Corp. and Silver Star Chemical Corp. and the complaint further alleges that in

carrying out this conspiracy, De Waltoff and Handel took various secret formulas, belonging to the plaintiffs and various secret lists of customers and that they have illegally interfered with the contracts made between the plaintiffs and the plaintiffs' customers. The complaint further alleges that Time Chemical Corp., De Waltoff and Handel illegally induced various key employees of the plaintiffs to leave their jobs without notice, thus seriously interfering with the ability of the plaintiffs to conduct their business.

It is also claimed that as part of the conspiracy, De Waltoff fraudulently represented to Sidney Livingston that he was moving to California for health reasons and was therefore desirous of selling his stock in the plaintiff corporations and thereby induced Sidney Livingston to purchase his stock in Chemclean Products and Silver Star Chemical Corp.

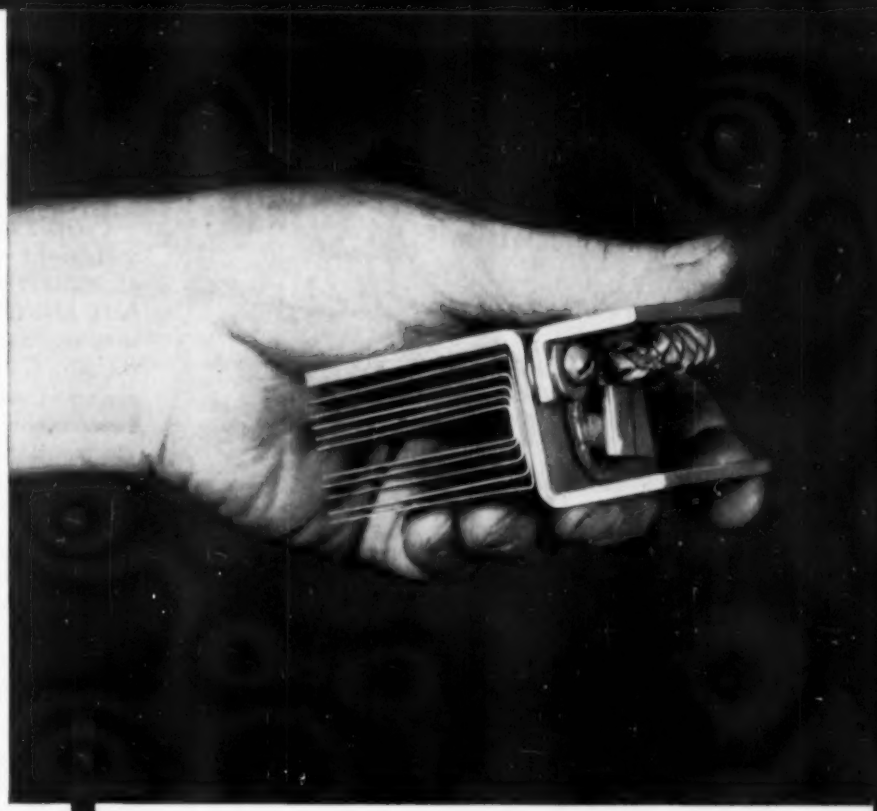
New Dealers—Following enthusiastic response to its line of plater's polarizers at the Industrial Finishing Exposition in Cleveland, Patwin Instruments has begun to open dealerships to sell and service these instruments. To date, the following firms are acting as dealers.

Adolf Frese Corp., Los Angeles, Calif.; Chipman Supply Co., Cincinnati, Ohio.; A. Bruce Edwards, Narbert, Pa.; W. M. Fotheringham, Buffalo, N. Y.; General Scientific Equipment Co., New Haven, Conn.; R. O. Hull & Company, Inc., Rocky River, Ohio; Instruments Associates, New York, N. Y.; LaSalco, Inc., St. Louis, Mo.; Vic Miner Co., Toledo, Ohio; Platers Research, New York, N. Y.; Process Engineering Company, Chicago, Illinois; Smoothex, Inc., Cleveland, Ohio; Swift Industrial Chemical Co., Canton, Conn.; True Brite Chemical Products Co., Oakville, Conn.; Advance Instruments, Needham, Mass.

New Agents—John G. Jones, vice-president and general manager of the A. W. Cash Company, Decatur, Illinois, has announced the appointment of three new agents for the Cash-Standard line of automatic valves, controllers, governors and regulators. Two Cash-Standard agents, it was also announced, have changed their firm names.

New agents appointed are: I. W. Cotton Company, Indianapolis, Ind., covering the central and southern Indiana territory; Fuel Economy Engineering Company, St. Paul, Minn., covering Minnesota, North Dakota, South Dakota and Northwest Wisconsin; and Keener Sales Company, Knoxville, Tenn., covering eastern Tennessee.

Name changes include: Quinn, McKerall & Quinn Company, Birmingham, Ala., formerly McKerall Engineering Company; and Whitlock Manufacturing Company, Chicago, Ill., formerly Reitz & Weeks Company.



GERMANIUM RECTIFIERS PERFORM WITH TOP EFFICIENCY

Udylite Tests Reveal
Amazing Current Conversion Efficiency

This air cooled germanium cell with a rectifying surface the size of a dime will handle a 250 ampere load in a three phase circuit continuously and three years of tests show no detectable power losses. Including heat-radiating fins, it takes up just 8 cubic inches of space and weighs only 12 ounces.

Udylite in cooperation with the General Electric Company, now proudly introduces its new group of germanium rectifiers. Years of research and testing have proven that no other metal known offers the high efficiency of germanium as a rectifier material.

In operations calling for medium to high voltages, such as barrel plating, anodizing or chrome plating the efficiency of germanium soon pays the cost since the efficiency of a 3-phase germanium cell is *98* to *99 percent.*

Even at high loading germanium has less than one-volt drop in the forward direction. As for reverse current, germanium is again particularly good, having a reverse-to-forward resistance ratio of 400,000 to 1. Furthermore, Udylite germanium rectifiers require little maintenance and can be located in areas of minimum ventilation.

For further information regarding germanium rectifiers—prices, deliveries and specifications—consult your Udylite representative or write today direct to:

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DETROIT 11, MICHIGAN

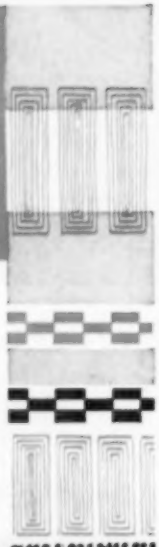
WORLD'S LARGEST PLATING SUPPLIER

From MEXICO

...and JOE-D

Come the Original

BIAS SISAL BUFFS



GUARANTEED FRAYPROOF PERFORMANCE!

The high-quality sisal used in every JOE-D Buff is grown and specially woven for JOE-D in Yucatan, Mexico. Top quality raw material is one reason why JOE-D Sisal Buffs are the finest on the market — fast-cutting, long-lasting. And JOE-D's original bias construction guarantees fray-proof performance — never a loose thread end to scratch or mar. Insist on original quality . . . specify JOE-D —you can't buy a better buff!

The JOE-D line covers a complete selection of Bias, Bias Sisal, Bias Spoke (Finger) and Conventional Buffs—as well as quality Polishing Wheels.

Holders of the original patent on Bias Sisal Buffs— U.S. Pat. No. 2642706

ATTENTION JOBBERS!

Some choice territories still available. WRITE TODAY!

the JOE-D Buff Company

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25 and 10 years ago . . .

TWENTY-FIVE YEARS ago, the opening statement in the October-November issue of MONTHLY REVIEW read, "IMPORTANT ANNOUNCEMENT. That the Review may reach its readers the first week of every month, the October and November issues are combined herewith. A change has also been made to a more substantial cover. We trust these innovations will meet with the approval of our membership.—W. J. R. Kennedy, Editor."

The Society was very much concerned over education, even as it is today. "A Class in Every Branch" was the subject of educational treatment after a suggestion by Dr. Blum in a letter on "Education of Electroplaters."

The 1930 issue went on to record the July 1, 1930 evening session at the Washington Convention with Mr. Sizelove of the Newark Branch as a speaker and Dr. W. Blum explaining the meaning of a round-table discussion. Almost the entire issue was devoted to methods of education for electroplaters, running of classes, etc.

The Society had some 25 branches and the President's letter exhorted all of the members to back up the Educational Bureau. The Branch News included excerpts from the papers presented at their meetings with 13 branches reporting.

TEN YEARS AGO, Dr. Samuel Glasstone included Part XXII of the "Fundamentals of Chemistry for Electroplaters" in the November issue, 1945.

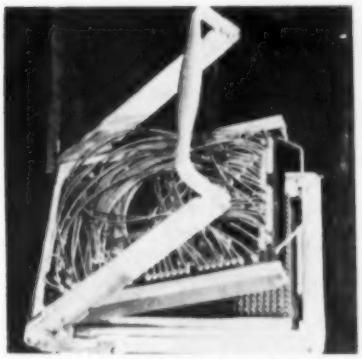
C. Nixon has an article called "A Modified Salt Spray Test for Chromium Plated Zinc Base Die Castings." H. P. Troendly wrote on "Manual of Operation for Salt Spray Testing Equipment." There was a report from AES Research Project No. 3.

The November issue also carried a notice that Harshaw Chemical Co. had been awarded a four-star Army-Navy "E" flag by the Manhattan Engineer District for atomic bomb work.

Branch News covered 16½ pages with 15 branches reporting.

All in all, an interesting and informative issue, digest size, contained 116 pages.

INDUSTRY NEWS



Phenolic control panels

Phenolic Control Panels Molded To Precise Tolerances—Problems of dimensional stability are overcome to permit close tolerance molding of phenolic control panels. The molder of the panels, Auburn Button Works, Inc., Auburn, N. Y., states that hole locations and hole diameters are held to close tolerances for interchangeability. In addition, the molded boards eliminate secondary drilling, milling, and certain finishing operations required on earlier models machined from laminated phenolic sheets.

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more important
NEW DEVELOPMENTS
from
THE CHEMICAL CORPORATION
Research Laboratory

LUSTER-ON® OLIVE DRAB N. D.
A dark, hard, stable olive drab coating. Applied in about 15 seconds at room temperature. Gives maximum corrosion protection. Meets most rigid specifications. Available in one package.

LUSTER-ON D
A powdered product to produce a bright clear conversion coating on zinc and cadmium.

LUSTER-ON ACTIVATOR
Designed for preparing a zinc alloy die casting prior to treatment in our Luster-On acid baths. Also serves as a mild cleaner. However, heavy soil must be handled by a pre-cleaner.

LUSTER-ON NS
The answer to "spotting out" troubles on thin copper and brass plate, especially under humid conditions. Improves adhesion, provides leveling action, saves lacquer. Eliminates fingerprints before assembly.

LUSTER-ON ALUMINUM SEALER (222-M)
Produces a chromate film on aluminum that provides excellent corrosion protection and can serve as a paint base. Now can be dyed in many attractive pastel colors. Meets requirements of Government Spec. MIL-C-5541.

•

Ask for literature. Send a sample for free laboratory treatment.

Luster-On products are manufactured on the West Coast by Crown Chemical and Engineering Company of Los Angeles, Calif., and in the Dominion of Canada by Alloycraft Limited of Montreal, Quebec.

You'll also be interested in our Safety Division's line of industrial skin cleaners and protectors . . . protect your workers and your products. Literature available.

L-18

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57 WALTHAM AVENUE
SPRINGFIELD, MASS.

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CLEANING COMPOUNDS FOR ELECTROPLATING SHOPS

TESTED AND APPROVED

In shop after shop, application after application, PERMAG Cleaning Compounds have taken all the guesswork out of cleaning operations.

Your problems in electrolytic and non-electrolytic cleaning can be solved easily with the unique, unusually effective PERMAG Soap Pre-Soaks.

Investigate PERMAG Cleaning Compounds today. Send us your cleaning problem for analysis and solution without obligation.

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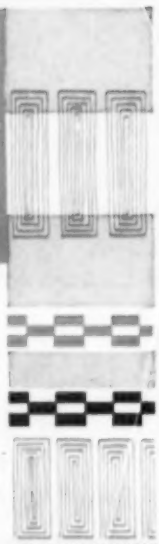
From MEXICO

...and JOE-D

Come the Original

BIAS SISAL BUFFS



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The high-quality sisal used in every JOE-D Buff is grown and specially woven for JOE-D in Yucatan, Mexico. Top quality raw material is one reason why JOE-D Sisal Buffs are the finest on the market — fast-cutting, long-lasting. And JOE-D's original bias construction guarantees frayproof performance — never a loose thread end to scratch or mar. Insist on original quality . . . specify JOE-D —you can't buy a better buff!

The JOE-D line covers a complete selection of Bias, Bias Sisal, Bias Spoke (Finger) and Conventional Buffs—as well as quality Polishing Wheels.

Holders of the original patent on Bias Sisal Buffs— U.S. Pat. No. 2642706

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Some choice territories still available. WRITE TODAY!

the JOE-D Buff Company

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25 and 10 years ago . . .

TWENTY-FIVE YEARS ago, the opening statement in the October-November issue of MONTHLY REVIEW read, "IMPORTANT ANNOUNCEMENT. That the Review may reach its readers the first week of every month, the October and November issues are combined herewith. A change has also been made to a more substantial cover. We trust these innovations will meet with the approval of our membership.—W. J. R. Kennedy, Editor."

The Society was very much concerned over education, even as it is today. "A Class in Every Branch" was the subject of educational treatment after a suggestion by Dr. Blum in a letter on "Education of Electroplaters."

The 1930 issue went on to record the July 1, 1930 evening session at the Washington Convention with Mr. Sizelove of the Newark Branch as a speaker and Dr. W. Blum explaining the meaning of a round-table discussion. Almost the entire issue was devoted to methods of education for electroplaters, running of classes, etc.

The Society had some 25 branches and the President's letter exhorted all of the members to back up the Educational Bureau. The Branch News included excerpts from the papers presented at their meetings with 13 branches reporting.

TEN YEARS AGO, Dr. Samuel Glasstone included Part XXII of the "Fundamentals of Chemistry for Electroplaters" in the November issue, 1945.

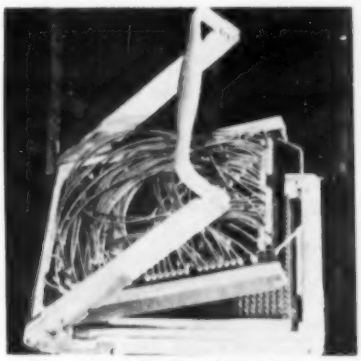
C. Nixon has an article called "A Modified Salt Spray Test for Chromium Plated Zinc Base Die Castings." H. P. Troendly wrote on "Manual of Operation for Salt Spray Testing Equipment." There was a report from AES Research Project No. 3.

The November issue also carried a notice that Harshaw Chemical Co. had been awarded a four-star Army-Navy "E" flag by the Manhattan Engineer District for atomic bomb work.

Branch News covered 16½ pages with 15 branches reporting.

All in all, an interesting and informative issue, digest size, contained 116 pages.

INDUSTRY NEWS



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NEW DEVELOPMENTS
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A dark, hard, stable olive drab coating. Applied in about 15 seconds at room temperature. Gives maximum corrosion protection. Meets most rigid specifications. Available in one package.

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A powdered product to produce a bright clear conversion coating on zinc and cadmium.

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Designed for preparing a zinc alloy die casting prior to treatment in our Luster-On acid baths. Also serves as a mild cleaner. However, heavy soil must be handled by a pre-cleaner.

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The answer to "spotting out" troubles on thin copper and brass plate, especially under humid conditions. Improves adhesion, provides leveling action, saves lacquer. Eliminates fingerprints before assembly.

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•

Ask for literature. Send a sample for free laboratory treatment.

Luster-On products are manufactured on the West Coast by Crown Chemical and Engineering Company of Los Angeles, Calif., and in the Dominion of Canada by Alloycraft Limited of Montreal, Quebec.

You'll also be interested in our Safety Division's line of industrial skin cleaners and protectors . . . protect your workers and your products. Literature available.

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CLEANING COMPOUNDS FOR ELECTROPLATING SHOPS

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In shop after shop, application after application, PERMAG Cleaning Compounds have taken all the guesswork out of cleaning operations.

Your problems in electrolytic and non-electrolytic cleaning can be solved easily with the unique, unusually effective PERMAG Soap Pre-Soaks.

Investigate PERMAG Cleaning Compounds today. Send us your cleaning problem for analysis and solution without obligation.

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50 COURT ST., BROOKLYN 1, N. Y.
In Canada: Canadian PERMAG Products, Ltd., Montreal

INDUSTRY NEWS

Pennsalt Selects New Hq.—Cincinnati has been selected as headquarters of a new district sales territory for the Metal Processing Chemicals Dept. of the Pennsylvania Salt Manufacturing Co., sales manager J. J. Duffy has announced.

Wilson

Wilcher

Directed by district sales manager Bill Wilson, the staff will include sales representatives Jack Cram, Frank Wilcher and Clay Brahm, and technical services representative Allan Lenio.

Included in Pennsalt's line of metal processing chemicals are Foscoat and Fosbond products and a variety of metal cleaners and special lubricants.

Hubbell Metals opens in Memphis—Hubbell Metals Incorporated, St. Louis, one of the largest distributors of metals in the Mid-West, has announced the opening of a plant in Memphis, Tennessee. The plant will serve the Memphis industrial area with complete stocks of steel, brass, copper, magnesium, aluminum, stainless steel, fasteners, fittings, valves and accessories, and will provide shearing and cutting service. Hubbell also maintains plants in St. Louis, Kansas City and Indianapolis.

Broemmelsick

Companies whose products are distributed by Hubbell include United States Steel Corp., Kaiser Aluminum and Chemical Corp., The Dow Chemical Co. (Magnesium), Revere Copper and Brass, Inc., Laclede Steel Co., Imperial Brass Manufacturing Co., Republic Steel Corp., H. M. Harper Co. and Granite City

Howard Broemmelsick is manager of the new Memphis plant. He has been associated with Hubbell Metals in various sales capacities since 1946, and has been in charge of the Memphis area. Sidney T. Wright, formerly with inside sales at Hubbell's Indianapolis plant, has also been assigned to Memphis.

Metalphoto Appoints Five New Dealers—Five new dealers, to handle its line of photosensitized aluminum plates, have been appointed by the Metalphoto Corporation, Cleveland, according to an announcement by George F. Brown, eastern district sales manager.

North Shore Nameplate, Inc., Bayside, Long Island, has been appointed to cover a territory consisting of metropolitan New York plus Long Island. The firm is headed by Eugene Turney.

Artplak Studios, headed by Ralph Diamond, and located at Fifth Avenue, New York, will also cover a territory consisting of metropolitan New York and Long Island.

The Garraway Company, Rutherford, New Jersey, and headed by John G. Orr, will cover northern New Jersey.

Vanadia Studio, Newark, has likewise been asigned the territory of northern New Jersey. President of the concern is Alexander Vanadia.

Metalphoto also announced the appointment of Princeton Photo Process, Princeton, New Jersey, to cover a territory bounded by the cities of Phillipsburg, Somerville, New Brunswick, and Trenton. The firm is headed by John Bliss.

Another fine product made finer . . .

with the PARAMOUNT "Finishing Touch"

"In jewelry merchandising, fine finishes are all important in catching customers' eyes," reports Shields, Inc., world-famous manufacturer of fine men's jewelry. "We have found that Paramount Felt Wheels can economically produce finishes which meet our standards — *and the customers'*."

Take a tip from Shields, Inc., — make sure the finish on your product is *creating* sales . . . not losing them. Discover how Paramount Felt Wheels can give you better finishes, faster and at less cost. Write, wire or phone today.

Paramount

Felt Wheels, Bobs, Sheet Felt

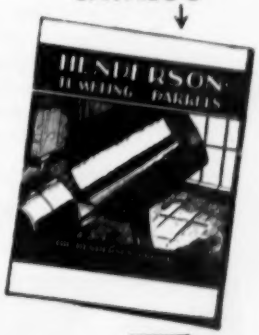
Bacon Felt Co.
407 West Water St., Taunton, Mass.

ONLY HENDERSON OFFERS THIS 3-PIECE CONSTRUCTION

In all Henderson Horizontal Cast Tumbling Barrels, one of which is shown above, the ends are separate from the body. As the body carries the load, it wears out long before the ends do. For a long time, therefore, with Henderson barrels, you will need to replace only the bodies, merely bolting on the original ends. Compared with the cost of complete new barrels, you can thus save as much as 40%!

After long experience in the finishing field, we like to recommend cast-iron barrels for most deburring and grinding jobs, but we make rubber, Neoprene, and wood-lined barrels — over 25 types, a barrel for every conceivable finish. Besides the highest quality of material and workmanship, when you buy a Henderson, you get a lot of "know how"!

***If You're A "Tumbler" Send for This* NEW CATALOG**



THE HENDERSON BROS. COMPANY

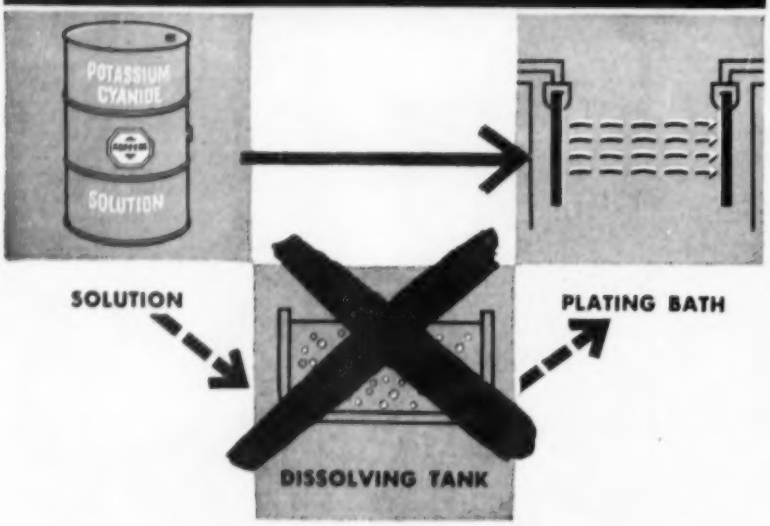
"The Tumbling Barrel People"

133 SOUTH LEONARD ST., WATERBURY, CONN.

SINCE 1880 — DESIGNERS AND BUILDERS OF TUMBLING BARREL EQUIPMENT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1116.

Short-cut to lower plating costs



with Koppers Potassium Cyanide Solution

KOPPERS Potassium Cyanide Solution (35-40%) eliminates the dissolving step in your plating operation. It is delivered to you, ready for the plating bath. Time-consuming preparation is out. There are no dangerous cyanide granules to handle, no drum cleaning, and no need to expose working personnel to cyanide powder dust.

All of these unique qualities of Koppers Potassium Solution add up to lower costs to you.

You can order Koppers Potassium Cyanide Solution in 55-gallon drums or in tank-truck quantities, ready to be pumped directly into your storage tank.

Potassium Cyanide is only one of the many synthetic chemicals produced by Koppers. Others include Resorcinol, Styrene Monomer, Polystyrene, Phthalic Anhydride, Divinylbenzene, and Di-tert-butyl-para-cresol.

For further information on any of these chemicals, write to:

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Chemical Division, Dept. P-115, Pittsburgh 19, Pennsylvania

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CHICAGO · DETROIT · HOUSTON · LOS ANGELES

INDUSTRY NEWS

Stauffer, Consolidated Chemicals Directors Approve Merger Plan—In a joint statement, Stauffer Chemical Company and Consolidated Chemical Industries, Inc. have announced that agreement in principle had been reached on a plan of merger of Consolidated into Stauffer. The plan was approved unanimously by the Boards of Directors of both companies at special meetings, and it will be submitted to the stockholders of both companies for their approval.

Speaking for their respective Boards of Directors, Christian de Guigne, Chairman of the Board of Stauffer, and George L. Bond, President of Consolidated, said that the plan provides for an exchange of 3¼ shares of Stauffer common stock for each share of Consolidated Class A participating preference stock, excluding the shares of Consolidated owned by Stauffer. If the merger is completed, 698,038 shares of Stauffer common stock will be issued in exchange for 214,781 shares of the Consolidated Class A stock. There are presently outstanding 2,350,240 shares of Stauffer common stock.

C. de Guigne also announced that the Stauffer Board yesterday increased the quarterly dividend payable on the Stauffer common to 40c a share, payable December 1, to stockholders of record on November 17. It is hoped that the merger will become effective and the new stock will be issued before the record date.

Total assets of the combined companies will be $120,000,000. The Consolidated Chemical Industries operations will be carried on under the name of "Consolidated Chemical Industries Division of Stauffer Chemical Company." No significant changes affecting personnel in either company are contemplated.

S. A. Day Mfg. Co. Reports—The Board of Directors of The S. A. Day Mfg. Co. Inc., originally founded over forty years ago, is pleased to announce that the fiscal year ending June 30, 1955 was a record year of sales, and that considering the recent capital expenditures, the profits were favorable. Management of the company changed February 1, 1955, after 43 years of continuous operation by the Day family. It was originally founded by Stanley A. Day in 1912, and continued successfully by his son, Harold A. Day since 1944. The present officers and directors are as follows: J. L. Martin, President; E. B. Wilson, Vice-President; J. H. Bowling, Secretary; F. H. Baldwin, Treasurer. The company, owned and operated by Buffalo people, has serviced the metal finishing industry both in Western New York as a distributor of polishing and plating supplies and nationally as a manufacturer of polishing and buffing compounds, and polishing and buffing wheels.

Norton Company to Build New Plant in Alabama—Foundations have just been completed for a new manufacturing plant owned by the Norton Company, with home offices in Worcester, Mass., according to the Daniel Construction Co. of Alabama. The new $1,285,000 plant will manufacture fused magnesia, fused zirconia, boron carbide, plus special materials for the Atomic Energy Commission. The plant will supplement the Norton Company's electric furnace facilities in Chippawa, Ontario, Canada.

The plant will consist of three manufacturing areas totalling 43,000 sq ft and an office area of an additional 4,000 sq ft. The entire plant will be on one story with brick construction over the office and transite for the manufacturing areas. The office will have plaster on the interior and will be air-conditioned.

The manufacturing areas will have fluorescent lighting used extensively. Cranes, conveyors, and elevators are to be included to handle the flow of materials. High voltage distribution will be provided for the electric furnace transformer with low voltage for light and power.

United Chromium Adds Franchised Applicators—Eight additional metal finishing firms have been appointed franchised applicators of Unichrome 5300, a sprayable plastisol made by United Chromium Division of Metal & Thermit Corporation, it was announced by D. R. Meserve, assistant sales manager.

The newly appointed applicators are: Barber-Webb Company, Los Angeles, California; Crane Equipment & Supply Company, Waterbury, Connecticut; Kaybar, Incorporated, Detroit, Michigan; Lithcote Corporation, Norwalk, Connecticut and Melrose Park, Illinois; Metal Cladding, Incorporated, Buffalo, New York; Metal Weld, Incorporated, Philadelphia, Pennsylvania; Paterson Rubber Company, Paterson, New Jersey; and Rack Processing Company, Dayton, Ohio.

Wide experience in applying organic coatings to metals, rigid control standards, adequate application and baking facilities and a reputation for high quality work are requisites for qualification as an applicator.

New Distributing Firm—Formation of a new industrial distributing firm and its appointment as a stocking distributor of Goddard & Goddard cutters in New York City, eastern New York state, northern New Jersey and northeastern Pennsylvania were announced jointly.

George L. Marshall, a Goddard & Goddard service engineer covering the entire country since 1944, will head the new distributing firm which will be known as the G. L. Marshall Company. Headquarters of the firm will be at 30 Church Street, New York 7, New York.

These ANODES cut costs

These are Federated's exclusive Conducta-Core anodes, the most economical lead anodes for modern chromium plating operations.

Conducta-Core anodes last up to three times as long as other lead anodes. The highly conductive and non-contaminating aluminum core rod runs the full length of the anode so they cannot warp or buckle. The Conducta-Core anode is designed with a greater number of high projections to give much improved throwing power and openings to provide self-cleaning action.

Let Federated serve as your single source for all plating materials. Copper, lead, zinc, tin, cadmium, brass and other non-ferrous anodes; high-quality full nickel content nickel salts; Zimax brighteners, in liquid and powder forms, for all types of zinc plating; Cadmax liquid brighteners for cadmium plating.

Think of Federated first when you need quality plating materials. Write directly to us for additional information on any of our plating products. Or get in touch with your nearest Federated Distributor.

Federated Metals

DIVISION OF AMERICAN SMELTING AND REFINING COMPANY
120 BROADWAY, NEW YORK 5, N. Y.
In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

Federated first in the non-ferrous field — AMD

Aluminum, Anodes, Babbitts, Brass, Bronze, Die Casting Metals, Lead, Lead Products, Magnesium, Solders, Type Metals, Zinc Dust

PERSONALS

Loren A. Patrick has joined the Los Angeles sales staff of F. J. Stokes Machine Company, Philadelphia, Pa., as a sales engineer, **Ray Anderson,** Stokes district manager has announced.

A native of LaGrange, Ill., Patrick was graduated from North Central College, Naperville, Ill., in 1952 with a BS in Engineering Science. Before joining Stokes, he was for three years a research and development engineer with North American Aviation, Inc., Inglewood, Calif.

He served two years in the Army toward the close of World War II as a post engineer in the infantry and took part in the occupation of Korea after V-J Day.

Patrick is a member of the Society of Automotive Engineers, the Society of Plastics Engineers, and the American Society of Mechanical Engineers

Donald R. Barber, general manager, announces that **John Drinkwater** has been appointed sales representative for the Michigan territory by Heatbath Corporation, Springfield, Mass. Drinkwater will handle the sales and service of their complete line of heat treating and metal finishing products in that area. Drinkwater is a graduate of Loyola College and has been associated with Frederic B. Stevens Inc. for the past five years.

Chester J. Nowak has been appointed plant superintendent of Wagner Brothers Equipment Co., the manufacturing division of Wagner Brothers, Inc. Nowak was formerly tool and die leader at Expert Tool and Die Company, from 1951–1955.

Nowak

Barber

The appointment of **Darius R. Barber** as controller of Brush Electronics Company, Cleveland, a principal unit of Clevite Corporation, has been announced by **Charles J. Mayers,** treasurer of Brush.

A native of Bainbridge, Ga., Barber has until now been assistant to the president and administrative manager of the engineering division of the Vulcan Copper & Supply Company of Cincinnati. Previously he was assistant to the business manager of the Washington Post, and a member of the accounting department of the Southern Bell Telephone & Telegraph Company.

Barber holds degrees from the University of Georgia and the Harvard University Business School. During the war he reached the rank of Lieutenant Commander, serving aboard the U.S.S. West Point and U.S.S. Dauphin.

He is a member of the Society for Advancement of Management, American Management Association, Armed Forces Chemical Association, District of Columbia Advisory Committee, and the University Club of Cincinnati.

William W. Watson has been named director of purchases, inventory and budget control of Wagner Brothers Equipment Co., announces **Joseph R. Wagner,** president. Prior to joining this firm, Watson was a buyer for the Garland Manufacturing Co., from 1946–1955.

Watson

McFarland

Atlantic Compound Company of Waterbury, Connecticut names **William R. McFarland,** president and general manager.

Under McFarland's direction a program of expanding production facilities is underway to meet the demand for greaseless polishing and buffing compounds in all grades and grit sizes.

McFarland was for several years with the Lea Manufacturing Company in various managerial capacities.

Leonard Smiley has been appointed manager of technical coordination in the Atomic Energy Division of Sylvania Electric Products Inc., it has been announced by **Stanley B. Roboff,** the division's manager of industrial coordination.

Smiley, who has had various duties in the Atomic Energy Division for the past three years, has in his new assignment responsibilities which include chemical operations; market research, analysis, and planning; and coordination of engineering cost estimates. He will also undertake special assignments in the atomic energy field for the Division.

Before joining Sylvania, Smiley was with the New York operations office of the U. S. Atomic Energy Commission, and had served with Singmaster and Breyer, consulting engineers.

Hanson-Van Winkle-Munning Co., Matawan, N. J., announces the addition of **David M. Roney, Jr.,** to their sales organization as administrative assistant.

Roney was graduated from the United States Naval Academy with a bachelor of science degree. Following graduation, he served with the U. S. Navy for nearly five years. Upon leaving the service, he attended the University of Pennsylvania Law School for one year prior to joining the Scintilla Division of Bendix Aviation Corporation. With Bendix for nearly two years, Roney was a sales engineer in New York State and Michigan.

In 1951 Roney joined Westinghouse Electric Corp. at East Pittsburgh, Pa., where he became application engineering manager in the electroplating projects department. In his new post at H-VW-M, he will be concerned with all phases of sales management.

Ralph E. Pettit, former vice-president and works manager of the Chicago Thrift Etching Corporation, has been named

Roney, Jr.

Pettit

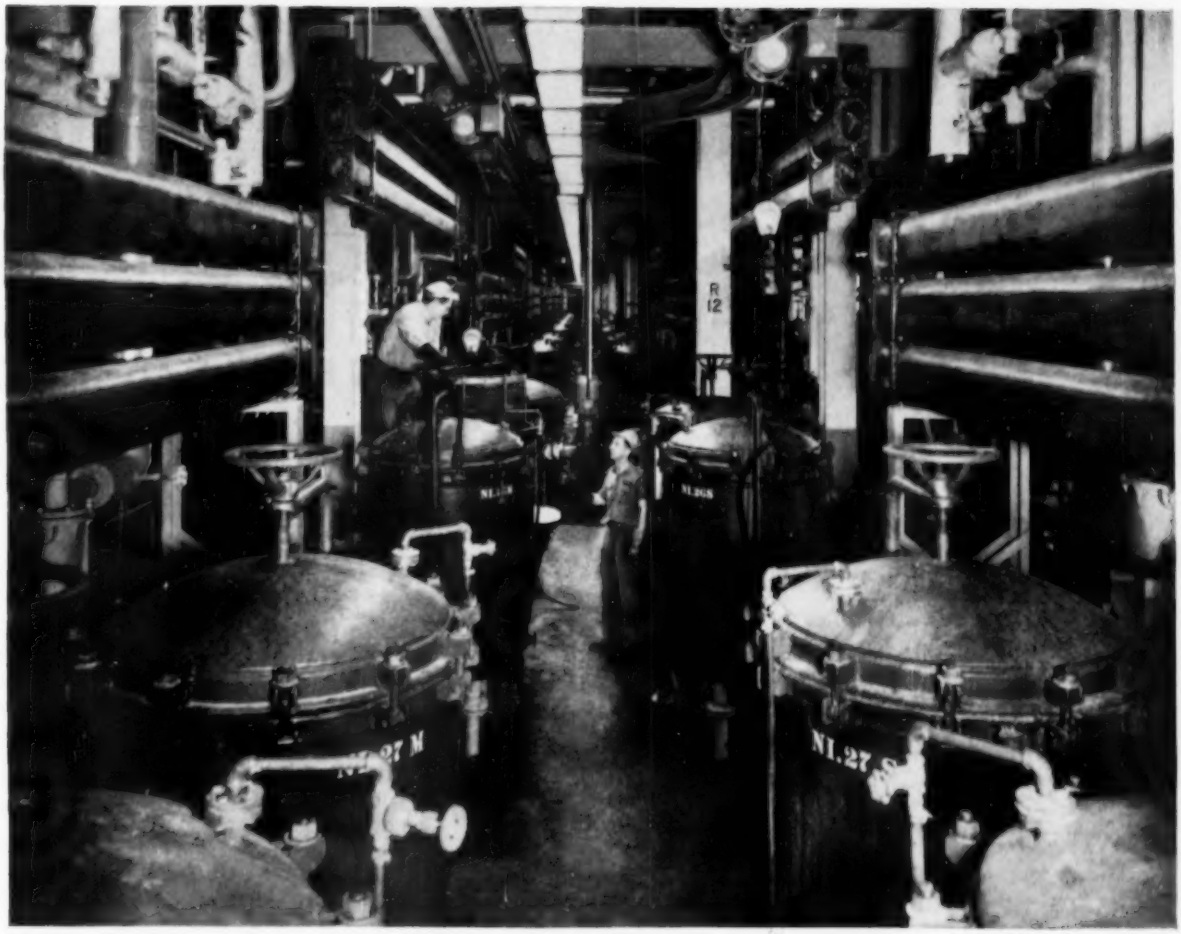
technical advisor in the metal industries department of The Diversey Corporation of Chicago. Pettit is also well known throughout the metal working industry as first vice-president of the Chicago Branch of the AES.

A University of Chicago alumnus, Pettit joined the Aluminum Company of America in 1928. During the next 19 years he was instrumental in the development and sales promotion of the now famous Alumilite process. This process promoted the use of aluminum to industry through the application of various finishes.

Leaving the Aluminum Company of America in 1947, Pettit was named general manager of the Chicago Thrift Company, manufacturers of etched metal goods. His responsibility extended to the labor, production and quality control fields.

In 1951, Chicago Thrift Company was merged with the Etching Company of America to become known as the Chicago Thrift Etching Corporation. At that time Pettit was named vice-president of the combined corporation.

In his new position with The Diversey Corporation, Pettit will work closely with the field sales force in solving difficult problems in the selection and application of processing chemicals in the metal industry.



48 Sparkler Horizontal Plate Filters in this installation

Why do the largest plating plants in the world Choose SPARKLER FILTERS?

The answer is simple, and obvious to plating engineers.

First — the cake on a Sparkler Horizontal plate filter will not crack or fall off with a variation in pressure or with a complete shut down of filtering. ***Second*** — dry cake disposal eliminates the sewer problem. ***Third*** — the quick-change plate assembly reduces the down time for cleaning each filter to a matter of minutes.

This is why many of the world's largest plating plants use Sparkler Filters exclusively.

Plating engineers can get full cooperation at Sparkler on any size installations.

SPARKLER MANUFACTURING CO., Mundelein, Ill.

Filtration engineering and manufacturing has been our exclusive business for over 30 years

Manufacturing plants in Canada, Holland, Italy, Australia

Service representatives in principal cities throughout the world

YOUR BEST BET

RESEARCH PROGRAM

IS

YOUR

COMPANY

KEEPING

UP!

300 COMPANIES

THREE HUNDRED INDIVIDUAL companies are actively supporting the American Electroplaters' Society Research Program. These companies have found that the benefits, both direct and indirect they are deriving from their sustaining membership make it an extremely worthwhile investment.

Direct Benefits

Regular printed reports on developments of all research projects.

Indirect Benefits

Strengthening of the electroplating industry with greater knowledge and improved methods and processes through research.

If you are not already a Sustaining Member, send your check for $100.00 to the American Electroplaters' Society, 445 Broad Street, Newark 2, N. J.

AMERICAN ELECTROPLATERS SOCIETY
445 Broad St., Newark, N. J.

INVEST NOW—THE AES RESEARCH PROGRAM

More reports of better chromium plating

Here are plants' experiences with deposits from Unichrome SRHS Solutions*

Companies using both SRHS Chromium Solutions and ordinary chromium have had an opportunity to compare results. Substantial differences have been reported.

BETTER COLOR NOTED

One plant of a well known company was using ordinary chromium over an ideal nickel surface. Another of this company's plants wasn't getting the best nickel deposit possible, but still its chromium plating had brightness superior to that of its sister plant. The second plant ascribed the difference to the SRHS Chromium being used in its tanks.

MINIMIZED REJECTS REPORTED

At one company, intricate parts were causing chromium plating difficulties. On occasion, rejects ran as high as 25%. Yet when the SRHS Chromium Solution was used, deposits covered beautifully and work was plated at a reject rate of no more than 0.4%.

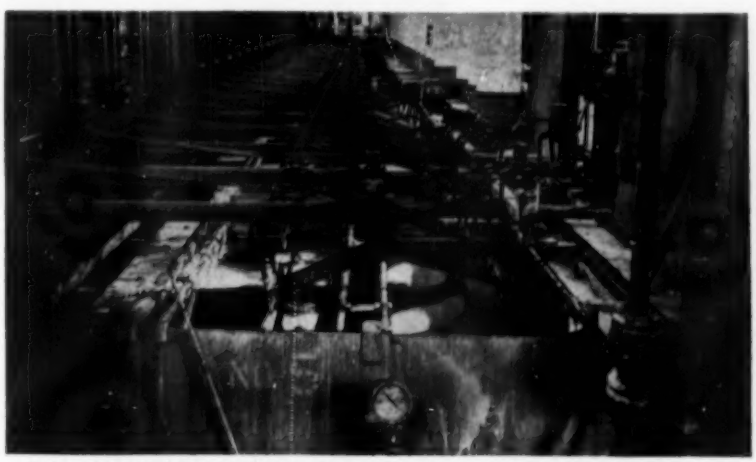
UNUSUAL WEAR RESISTANCE FOUND

A large tool company chromium plated punches used in the manufacture of nuts. Various chromium solutions were tried. They reported that while ordinary chromium doubled the output from punches, deposits from SRHS Chromium tripled it.

All these reported "deposit-advantages" are in addition to the many thoroughly confirmed operating advantages of SRHS Chromium baths. These include plating with higher cathode efficiency, greater speed, a saving in power, and self regulation of important bath constituents.

Platers not using Unichrome SRHS Chromium will find it to their advantage to get the facts by writing United Chromium.

**Trade Mark*



Performance of SRHS Chromium Solutions has resulted in their extensive use by major plating plants.

A complete "package" of processes for chromium finishing

Unichrome Copper, Unichrome Bright Nickel and SRHS Chromium are so thoroughly suited to each other, they represent something unique in finishing. They're the first matched set developed exclusively by one company. Used together, they add up to more advantages than the sum of their individual benefits.

Better Operations and Results

Unichrome Pyrophosphate Copper contains no cyanide, saves disposal costs, and reduces or eliminates much buffing expense.

Unichrome Bright Nickel cuts downtime for purification, has unusual operating stability.

When both of these processes are used along with SRHS Chromium, benefits begin to multiply. The copper proves active for the nickel. In turn, the nickel shows unusual receptivity for the chromium. Passivity problems are eliminated. Downtime drops, rejects become rare.

Moreover, service responsibility rests with one source, assuring prompt technical help and a smooth running operation.

Bulletins supply details on each of the processes. Send for them.

UNITED CHROMIUM DIVISION
METAL & THERMIT CORPORATION
100 East 42nd Street, New York 17, N. Y.
Waterbury 20, Conn. • Detroit 20, Mich.
East Chicago, Ind. • El Segundo, Calif.
In Canada:
United Chromium Limited, Toronto 1, Ont.

ULTRASONIC CLEANING

for . . . Fast . . . Efficient . . . Thorough

METAL-WASHING and SOLVENT DEGREASING

Rapid, thorough cleaning and degreasing of metal and metal parts, within seconds, is now possible with the BRANSON SONOGEN* Ultrasonic Generator.

The *SONOGEN** cleans and degreases by ultrasonic action. High-frequency electric energy from the generator is converted into mechanical vibrations by the transducer and transmitted through the solvent, creating a scrubbing effect on the surfaces of the part to be cleaned. Ultrasonic washing is equally effective and fast in small crevices, indentations, holes, etc., that would require a great deal more time to clean by ordinary methods.

Ultrasonic cleaning may be carried out with complete safety on all types of parts from the most delicate watch mechanisms to heavy, complex castings.

R-F POWER 40 WATTS TO 10 KW—HERMETICALLY SEALED TRANSDUCERS. *Catalog S-11*

Removal of buffing compound under ultrasonic impact

Model No.	Normal Cleaning Area in Sq. Inches
AP-10	12
AP-25	42
APT-100	120
APT-400	480
P-1000	1,200

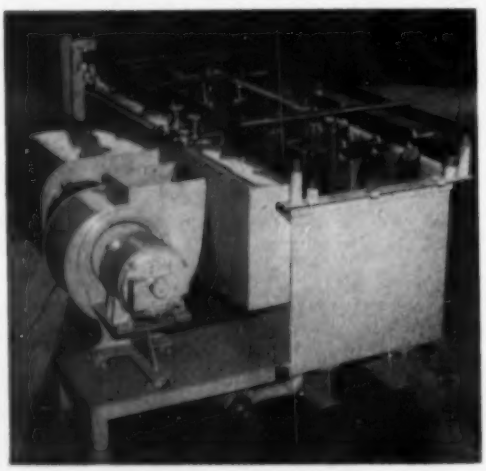
BRANSON ULTRASONIC CO.

202 Richmond Hill Avenue . Stamford . Connecticut

Division of Branson Instruments, Inc.
Specializing in Ultrasonics since 1946.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1122.

For tank cycles that excel in service life— see STORTS



BUYERS of Stortswelded plating tanks have proved by performance records that it pays to invest in Storts single-standard welding—one quality for all customers.

Storts experience in the fabrication of single tanks and complete cycles for many hundreds of severe service requirements will help you to design for top performance and long range economy.

42 STONE STREET — STORTS WELDING COMPANY INCORPORATED — MERIDEN, CONN.

Manufacturers of Welded Fabrications to Specification

1360 FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1123.

PERSONALS

Metal & Thermit Corporation, producers of metals, industrial chemicals, welding equipment and supplies, has announced the appointment of three chemical engineers.

Adler

Leonard L. Adler has joined Metal & Thermit as senior development engineer at the company's East Chicago, Ind. plant. Adler is a native of Cleveland, Ohio. He received a BS degree in Chemistry from Case School of Technology, Cleveland, in 1948, and comes to M & T from Olin Mathieson Chemical Corporation.

Richard W. Davis will be located at the Metal & Thermit Research Laboratory, Rahway, N. J., as chief development engineer. Davis was born in St. Louis, Mo., and was graduated from the University of Michigan in 1943 as Bachelor of Science in Chemical Engineering. He was previously connected with General Aniline and Film Co.

Davies

Pollock

Alvin S. Pollock joins Metal & Thermit as process engineer at Carteret, N. J. He attended Carnegie Institute of Technology and Rensselaer Polytechnic Institute, graduating from the latter as Chemical Engineer in 1945. He also received a master's degree in Chemical Engineering from Columbia University in 1947. Pollock was formerly with Colgate-Palmolive-Peet and Allied Chemical & Dye Corporation.

Richard A. Ogden, treasurer and assistant to the president of The Permutit Company and subsidiary companies, has been elected secretary in addition to his other duties, according to an announcement by **Henry W. Foulds,** president.

A. F. Bogle, controller, and **A. E. Marciante,** assistant treasurer, were elected assistant secretaries in addition to their other duties.

George N. Proctor, vice-president of The Permutit Company, manufacturers of ion exchangers and water conditioning apparatus, has been elected a Member of the Board of the Simplex Valve & Meter Company, Lancaster, Pa., according to an announcement by **Henry W. Foulds,** president. Proctor, associated with both concerns since 1944, was elected vice-president of Simplex in March 1950.

The Simplex general office has been located in Lancaster since the first of January.

Proctor

Cairns

J. A. Cairns has been appointed sales manager of Allied Research Sales Corporation, Baltimore, Md., effective September 1, it has been announced by **L. C. Kingsbury,** vice-president-in-charge-of-sales. Allied Research Sales Corporation is the marketing subsidiary of Allied Research Products Inc., manufacturers of the Iridite line of chromate conversion coatings for non-ferrous metals and ARP Plating Chemicals.

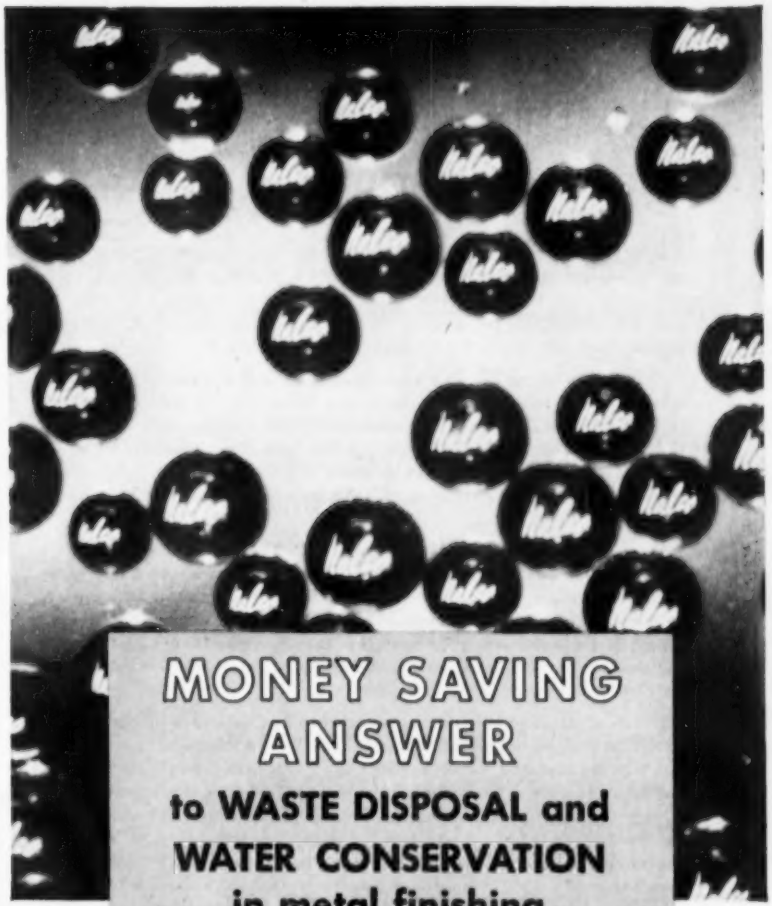
Cairns joined the Allied organization in 1948 and in 1951 was made district sales manager for the eastern Pennsylvania-northern New Jersey territory. In 1954, he was brought into the Baltimore home office as manager of special projects. In his new capacity as sales manager, Cairns will have jurisdiction over the company's direct sales districts as well as the distributor organization and the warehouse network. He will report directly to Kingsbury.

Prior to joining Allied, Cairns had acquired 12 years of production plating experience at the General Electric Company in Philadelphia, as well as at the Ronson Lighter Company. He had also been a finishing specifications engineer at R.C.A., Camden.

Cairns holds a degree in Chemical Engineering from the Drexel Institute of Technology and is a member of the AES and the ASM.

P. S. Brallier has been named technical advisor to the president by **Hans Stauffer,** president, Stauffer Chemical Company. Brallier, who can count almost 40 years of service with the Company, had been director of market research and development.

Stauffer also appointed **A. N. Wohlwend,** director of market research and development. Wohlwend moves up from the post of sales development manager.



● Photomicrographed above are tiny Nalcite® Ion Exchanger spheres—the answer to your problems of waste disposal and effective water conservation in plating and anodizing processes.

Nalco Ion Exchangers can serve you two ways:

Cation exchange treatment of plating solution recovers chromic acid... assures nearly 100% use of chrome, and eliminates complaints about toxic wastes.

Deionization of rinse solutions recovers chrome and eliminates drag-out losses ... provides pure, reusable water for a perfect spot-free rinse. Cost-wise, Nalco's recovery and reuse program will save you money.

TECHNICAL DATA

Complete technical data on Nalcite Ion Exchangers' performance and characteristics are yours for the asking. Write for Report "Ion Exchange in Metal Finishing."

NATIONAL ALUMINATE CORPORATION

6301 West 66th Place • Chicago 38, Illinois

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PRODUCTS . . . Serving Industry through Practical Applied Science

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1124.

$$E = 2\pi^2 dn^2 a^2$$

THE FURY OF SOUND

How can you picture parts to be cleaned being dragged through a sea of solvent at seventy miles per hour? How can you capture a will-o'-the-wisp that is neither liquid nor solid as it moves through a liquid at 1200 feet per second? Well, we despaired and so we asked Stanley Rich of General Ultrasonics how he would do it.

The picture of one of GU's sonicells at work is the product of Rich's attempts. He took the photograph (see below) in 200 microseconds (1/5000 sec) and some of the cavitation bubble streaks were ¼ inch in length. It was clear that although the bath itself appeared to be relatively still (except for hissing noise and movement of bubbles) there were both gaseous and liquid elements of that bath moving at 70 miles per hour.

We had to give up that idea for a cover. The only thing left was to turn to the fertile imagination of an artist and here we were lucky. Richard Huntley, the newest member of the PLATING Staff, is an excellent artist of unusual imaginative abilities. He worked out the simple and colorful cover we have this month. The design portrays the passage of an object to be cleaned down into an ultrasonically agitated bath—and it comes out clean.

Huntley, our production manager, tried to fuse a number of symbols to tell the story of ultrasonic cleaning. That he took liberties is obvious, but that he managed to tell a whole story with utter simplicity may not be so apparent. We might ask our readers how they would portray a high-velocity movement that manifests itself in a sound so high that the human ear fails to detect it. We might ask how one is to show that cavitation (fracture of the liquid) most easily occurs at the weakest points in liquids and these weakest points are always interfaces between solids and liquids or gasses and liquids. (For a dramatic picture of cavitation, see Branson Ultrasonic Company's ad on page 1360).

Of course, commercial-scale ultrasonic cleaning was not possible until some manner was invented that would give us the intensity of sound and the protected methods of generation which are now available. Unprotected Barium Titanate, small pieces of quartz, etc., were fine for laboratory applications, but for production purposes new generating equipment had to be devised.

Our cover, then, speaks of an application which may prove to be of inestimable value to the electroplating field. When we have high enough turbulence and high velocities, we also produce extremely rapid replacement of cathode and anode stagnant films of electrolyte. This permits substantial increase in the plating current. Ultrasonics is not limited to cleaning.

And so, we thank Stanley Rich of General Ultrasonics for his efforts and tip our hats grandly to Richard Huntley for his perspicacity in projecting simple symbols in a simple design to describe inordinate complication.

The Editor

PERSONALS

L. D. Long will represent the laboratory supply firm of Arthur S. LaPine & Company in Louisiana and the Gulf Coast.

Long's previous experience has been as a chemist in Chattanooga, Tenn. and Columbus, Ohio, laboratories and with Southern Regional Laboratories in New Orleans.

A native of Gadsden, Alabama, Long obtained his BS in Chemistry in Jacksonville State College in Alabama and a MS in Chemistry at George Peabody College in Nashville, Tennessee.

The General Electric Company has announced the election of **William A. Mann** of Chicago as a commercial vice-president. He has been assigned as resident officer in a newly-established G.E. regional headquarters in St. Louis, **Henry V. Erben,** G-E executive vice-president, reports.

Mann has been central district manager of the company's User Industry Sales Department in Chicago and prior to that was manager of G-E's Apparatus Sales Office in Milwaukee.

The new vice-presidential territory will cover the states of Missouri, Kansas, Kentucky and parts of five others and will include the cities of Kansas City, Wichita, Indianapolis, Louisville, Memphis and Little Rock as well as St. Louis.

Increasing customer relations, commercial and company activities in the area led to the establishment of the new company officer in St. Louis. The region previously was served by commercial vice-presidents in Chicago, Atlanta and Cleveland.

Mann joined the company upon graduation from the engineering test course in Schenectady, and three years later was transferred to the company's Chicago office in industrial sales. Mann rose in the sales organization to assistant district manager of industrial sales, and in 1948 was appointed manager of G-E's Apparatus Sales Office in Milwaukee.

Mann will establish headquarters in the Paul Brown building in St. Louis where the company's Mid-States Apparatus Sales District headquarters is located.

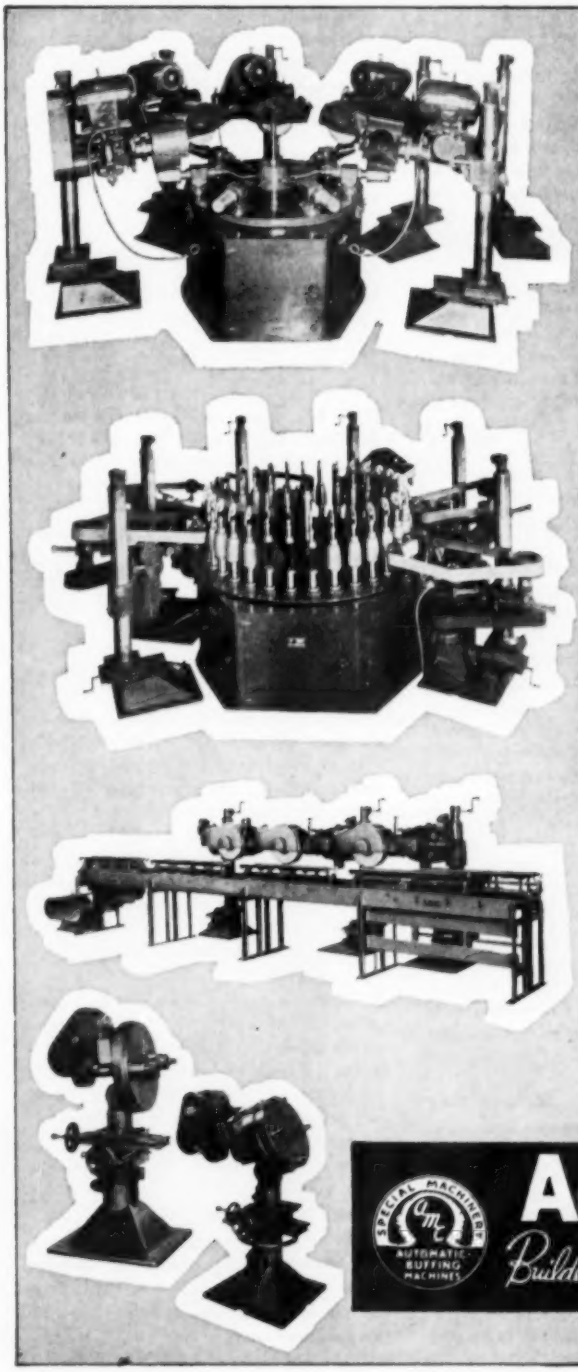
J. S. Gillespie, formerly manager of product planning, was appointed manager of the newly organized diamond project section of Carboloy Department of General Electric Company, Detroit.

In his new assignment, Gillespie will be responsible for transforming laboratory techniques of making man-made industrial diamonds, developed by G.E.'s Research Laboratory, into practical production methods.

Gillespie joined Carboloy in 1936 as an engineer. Before being appointed manager of product planning, he served in several Carboloy district offices, as manager of tool and wear parts sales engineering and as manager of product sales.

ACME *Automatic*
POLISHING *and* BUFFING MACHINES

are engineered for low cost, high production finishing...



- For Polishing and Buffing, De-burring, Wire Brushing and Micro-finishing
- Rotary *Automatics* Straightline *Automatics* *Semi-Automatics*
- Backed by half a century of specialized experience and progressive development
- Proved performance and dependability in industry

RECOMMENDATIONS and QUOTATIONS

We will be pleased to receive blue prints or preferably finished and unfinished samples of the part you contemplate finishing together with detailed information on present finishing operation and production requirements. On receipt of samples and data we will offer recommendations and quotations.

ACME *Manufacturing Co.*

1400 E. 9 MILE RD., DETROIT 20 (Ferndale) MICH.

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR NEARLY HALF A CENTURY

CATALOGS ON REQUEST

TRADE LITERATURE

About Good Connections

L—1100. Pipe, Fittings, and Valves—A new 12-page catalog has just been released by Falls Industries, Inc. It covers the operating and dimensional specifications of IMPERVITE (including the Impervite Rupture Disk), as well as diaphragm and custom-designed valves.

For comparative purposes, physical properties are charted for graphite, Impervite (resin impregnated graphite), and Graph-I-Tite (carbon-impregnated graphite developed by Graphite Specialties Corp., a Falls Industries' associate company).

Impervite is an improved form of resin-impregnated graphite. Pipe made from this material is relatively light in weight and is unaffected by almost all corrosives. It is immune to the effects of thermal shock, and is absolutely noncontaminating. It can be readily threaded or can be serrated and joined by means of flexible couplings. It is suitable for use at temperatures to 340° F and operating pressures to 75 psi hydrostatic or 50 psi steam.

"Graph-I-Tite" is a unique new material of construction which has all of the properties of Impervite plus ability to withstand the effect of almost all corrosives at any temperature. It is not "wetted" by molten metals and salts.

This new catalog also contains a complete section entitled "Methods of Connection." It gives detailed instructions on how to cut threads, serrate and cement pipe in the field, using portable tools. Also, one section of the catalog covers maintenance and installation tips with special attention to thermal expansion, subassemblies, flexible couplings, and supports.

L—1101. Pumping Heat Exchanger—The first catalog page on the Impervite "pumping-x-changer" has just been released. This latest development of Falls Industries is designed to meet the growing need for a simplified, packaged, combination pumping and heat transfer unit for use in pilot plants, plating and pickling operations, pharmaceutical applications and similar small batch processes.

The "pumping-x-changer" is comprised of a standard Impervite tube and shell heat exchanger assembled as a unit with a standard Impervite centrifugal pump. Heat transfer, gpm, and pressure specifications contained in the new catalog page show that "pumping-x-changers are furnished with up to 917 sq ft heat transfer surface and can handle up to 200 gpm at 100 ft head.

The Impervite tubing used in the exchanger section of the unit is produced by a special extrusion method which eliminates laminations and stops spalling at the high temperature limit. In addition, Impervite is immune to the attack of all corrosives except a few highly oxidizing agents, it possesses an extremely high rate of thermal conductivity, is completely unaffected by thermal shock, and is relatively light in weight.

L—1102. Vacuum Melting—A new technical bulletin on vacuum melted metals and alloys which includes both general information and technical data was issued recently by Carboloy Department of General Electric Company, Detroit.

The 23-page publication, referred to as VM-101, covers the effects of vacuum melting on properties of various metallic materials, benefits of the process to the user of such metals and fabricating and machining recommendations. It also includes detailed engineering data on two new vacuum melted high temperature alloys, M-252 and J-1570, now in commercial production.

L—1103. Low Cost Humidity Chamber—Four-page, two-color brochure issued by the Blue M Electric Co. illustrates a new low cost annular mechanical convection controlled relative humidity chamber known as Vapor-Temp.

Due to low cost and small work area required, Vapor-Temp permits many humidity tests to be conducted simultaneously. Now each laboratory section can have its own controlled humidity chamber. Vapor-Temp automatically controls relative humidity to plus or minus 1 per cent.

Bulletin 5525 contains complete construction specifications, prices of Vapor-Temp. Also, a brief description of larger sizes of counter-flow controlled humidity cabinets.

L—1104. On Vacuum Pumps—A new 52-page catalog of its complete line of high vacuum pumps, featuring an engineering section containing formulae and data of practical value to all vacuum engineers, is available from Kinney Manufacturing Division, The New York Air Brake Company.

Designated Catalog No. 425, attractively printed in two colors, profusely illustrated, and containing many cutaway drawings, diagrams, graphs, performance curves, installation pictures, tabulations of data, conversion tables, charts and formulae, this publication is actually a comprehensive vacuum engineering reference book.

The catalog section devotes many pages to the compound, single stage simplex, single stage duplex and two-stage mechanical booster high vacuum pumps in the Kinney Line, described as "the most extensive of any in the world."

Ranging in size from a ¼ hp unit which has a displacement of 2 cu ft/min to a 40 hp unit having a displacement of 780 cfm, these pumps are designed to create the low absolute pressures required in all fields of modern vacuum processing.

L—1105. Sprayed Metal Coatings—An illustrated two-color, four-page bulletin on sprayed metal coatings for contamination and corrosion protection has just been made available by the MW Protective Coatings Division of Metalweld, Inc.

This bulletin gives considerable data on the application of sprayed metal coatings to processing equipment, storing and shipping containers, tanks, tank cars and food handling equipment, to provide contamination protection for products such as foods, sugar, dairy products, liquid soaps, glycerine, transparent lacquers, solvents, oils, neat products and neutral solutions.

It also discusses the combinations of vinyls, furans, phenolics, epoxys, silicones, Neoprenes and Chlorinated Rubber with sprayed metal to provide corrosion protection for bridges and trestles, tanks of all kinds, steel piling, ship and boat hulls, superstructures and interior equipment, refrigeration equipment, underground conduits and fabricated steel.

L—1106. Infrared Spectroscopy—Reprints of an informative, authoritative article surveying the usefulness of infrared spectroscopy as a research and development tool in the industrial laboratory are now available from Beckman Instruments, Inc.

The article is by R. Bruce Scott and J. M. Vandenbelt of Parke, Davis & Co.'s research laboratories.

The authors touch on the behavior of compounds absorbing infrared energy, present a number of infrared spectra showing characteristic absorption bands of various compounds and outline the many possible infrared applications.

Cut costly buffing— get better results with "PR" plating

The piece at the left was plated by the usual cyanide process and buffed. The piece on the right was "PR"—Periodic Reverse—plated but was not buffed. Result: Much of the cost was saved and the "PR" plated piece had far superior leveling!

You too can eliminate or greatly reduce expensive prefinishing and get superior leveling like this by using "PR"—Periodic Reverse—plating and Westinghouse Wes-X® compounds. The electrical "back-stroke" feature of "PR" plating continuously refines the grain structure. "PR" plating eliminates nodules, does away with build-up of metal at corners and sharp points, and covers such defects as die marks and scratches.

"PR" plating is a patented Westinghouse process. It is available to you through your local Westinghouse sales engineer. Let him make a free survey of your plant. Call your nearest Westinghouse sales office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-10445-A

YOU CAN BE SURE...IF IT'S

Westinghouse

BUFFED

INDICATE A 1126.

"PR" PLATING

TRADE LITERATURE

L—1107. Bright Dipping Al_2 or Brass—Details of an automatic immersion processing machine designed for the bright dipping of aluminum and/or brass are covered in a selection of trade publication reprints available from the equipment manufacturers.

The articles cover descriptions of two automatic bright dipping operations—one, a small aluminum and brass forging manufacturer and the other, a major manufacturer and user of brass parts.

Labor, acid and space cost savings are detailed. Layouts of the two operations are also included as offered by Frederic B. Stevens, Inc.

L—1108. Alternator Systems—A new four-page brochure, illustrating and describing its line of alternator systems, has just been published by the Leece-Neville Company. The line marks the first time that a company has produced an a-c electrical system that is competitively priced with "extra" output d-c systems.

Models include a light-duty unit and a heavy-duty unit, both with capacities of 12 volts, 50 amperes; also available are a light-duty model and a heavy-duty model with capacities of six volts, 60 amperes. Features of the line include lower initial cost, plus marked savings during installation, and greatly reduced maintenance time and costs.

The free literature contains both product and application illustrations plus detailed specifications. Operating and installation information is likewise included.

L—1109. Polyethylene Sink Trap—Latest issue of LANCO Apparatus News (Volume 7, No. 1) has been published by Arthur S. LaPine & Company. Featured items are a new model polyethylene sink trap, Flash-Evaporator, separatory funnels and burettes with Teflon plugs, and a "Do-It-Yourself" Water bath with a new electronic relay.

A four-page tabular presentation of 15 electric, magnetic, and pneumatic laboratory stirrers facilitates selection.

Among the equipment described are a direct-reading thermistor Tele-Thermometer, new model Harvard trip-balance, 45,000-rpm homogenizer, sling psychrometer with built-in slide rule, slide and film strip projector, opaque projector, drawer cabinets for 2 x 2 slides, particle size apparatus for sub-sieve range, stainless steel beakers, lattice support clamps, and a marking pen.

L—1110. Electropneumatic Control—Complete information about L&N's new Series 60 Current-Adjusting Type Control Unit and its associated converter for electropneumatic control is now available in an 8-page folder just published by Leeds & Northrup Company. This new publication describes how this control system—which includes a Speedomax G or H indicator/recorder—combines the advantages of pneumatic valve operation with the flexibility and fast response of an electrical control system.

Included in this folder are photographs and line drawings illustrating the complete control system and all pertinent details of both the cat control unit and the electropneumatic converter. Also included is a description of how the control unit provides proportional, automatic reset and rate actions.

L—1111. First Film on Ductile Cast Iron—The first motion picture film on the properties and applications of ductile cast iron has been released by The International Nickel Company, Inc., and is now available for use by industry, technical societies, and educational institutions.

The 15-minute sound, color film, "Ductile Cast Iron," graphically illustrates the fact that the new engineering material which can be cast like grey iron has properties similar to steel. The ductility of the iron is illustrated by bending, twisting, impact and tensile tests.

The film, "Ductile Cast Iron," incorporates five years of production experience and use of this material. Among the illustrated applications are gears, pinions, plow shares, pistons, and pneumatic couplings. Uses of ductile cast iron are also shown for a variety of industries.

Ductile cast iron is produced by approximately 115 companies in the United States and 300 companies throughout the world.

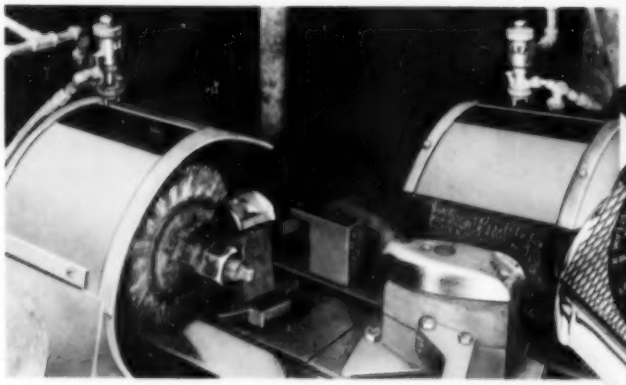
'nough said!

Why not send us an order to cover your next spot need?

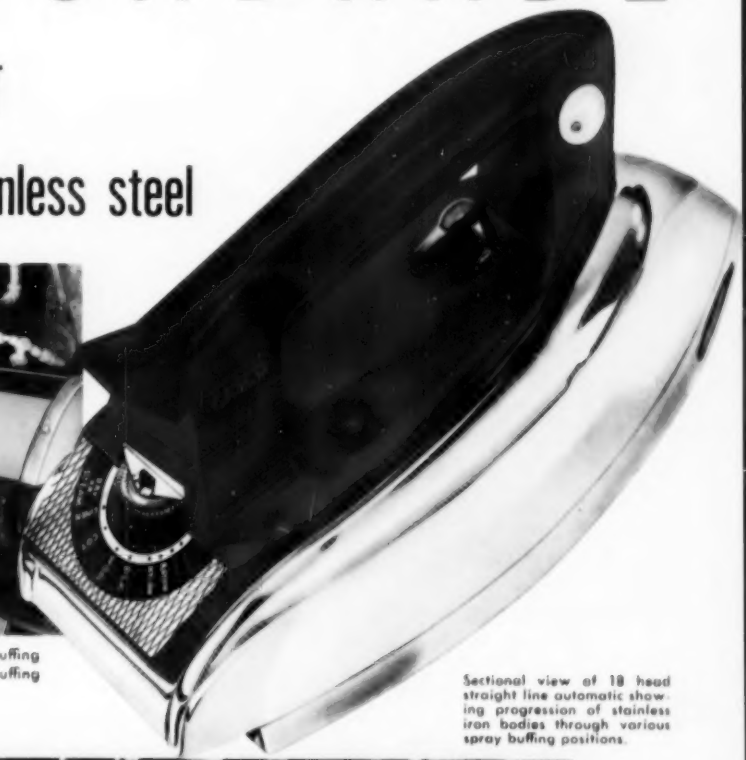
BETTER FINISHES & COATINGS, INC.
268 Doremus Ave., Newark 5, N. J. • 2014 East 15th St., Los Angeles 21, Calif.

LEA LIQUABRADE

for HIGH SPEED – LOW COST AUTOMATIC finishing of stainless steel

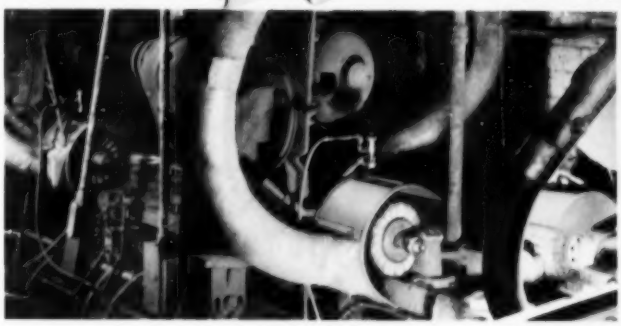


Close up of Lea-Engineered Spray Buffing System using Lea Liquabrade on side buffing



Sectional view of 18 head straight line automatic showing progression of stainless iron bodies through various spray buffing positions.

at CASCO



These gay new Casco Steam and Dry Irons are gleaming, durable, stainless steel . . . inside and out. Uses plain tap water even in hard water areas. And, to get this gleaming finish on the stainless steel case, CASCO uses LEA LIQUABRADE with the Lea-Engineered Spray Buffing System.

Yes, sir . . . and CASCO uses LEA LIQUABRADE on a big straight line automatic buffing machine that really does a job. From rough draw to high lustre in a continuous high speed, low cost, automatic operation.

For real finishing line flexibility you can't beat the Lea Spray Buffing Package Plan — Lea Liquabrade and Lea-Engineered Spray Buffing Equipment. May we help you put your finishing line on a PAY-LESS-AS-YOU-GO basis?

The LEA GROUP
serving the Finishing Field
The Lea Mfg. Co., Waterbury, Conn.
Lea-Michigan, Inc., Detroit
Lea-Ronal, Inc., Jamaica, N. Y.
Lea Mfg. Co., of Canada, Toronto
Plating Polishing Buffing Burring

Burring, Buffing, Polishing, Lapping, Plating and Spray Finishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions. Manufacturers of Lea Compound and Learok . . . Industry's quality buffing and polishing compounds for over 30 years.

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Lea Mfg. Company of Canada, Ltd., 370 Victoria St., Toronto 2, Canada
Lea-Ronal, Inc., Main Office and Laboratory: 139-30 109th Ave., Jamaica 35, N. Y.
Manufacturing Plant: 227 East Aurora St., Waterbury 20, Conn.

Are you interested in Plating Specialties? **SEE THE OTHER SIDE OF THIS INSERT.**

OUTSTANDING!

Lea-Ronal

Bright Nickel Process

You Get { Extremely Ductile Deposits
Brilliance
Leveling

Would such a nickel plating process meet your objectives better than the processes and solutions you are now using?

Here are some of the Lea-Ronal Bright Nickel advantages:

- Lea-Ronal Bright Nickel produces ductile deposits that permit bending, forming operations, and welding without cracking.
- . . . ductile deposits that withstand blows and impact shocks without cracking.
- . . . ductile deposits that are extremely bright and white in color .
- Lea-Ronal Bright Nickel has excellent leveling characteristics for a bright nickel.
- . . . has high throwing and covering power regardless of brightness desired.
- . . . has high tolerance to metallic and organic impurities.

You can easily convert your present nickel plating methods to the Lea-Ronal Bright Nickel Process, using Lea-Ronal Nickel Gleam Addition Agents as brighteners. Our process serves equally well for either still tank or barrel plating.

Place a trial order for Lea-Ronal now. Make a competitive test with one tank or barrel now being used in your present production schedule. Then note the difference in results . . . and costs!

Lea-Ronal *Inc.*

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Lea-Michigan, Inc., Detroit
The Lea Mfg. Co., Waterbury, Conn.
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Plating Polishing Buffing Burring

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Are you interested in Plating Specialties? SEE THE OTHER SIDE OF THIS INSERT.

REPORTS FROM ALL OVER
. . . stripped, cleaned and degreased

(This section is especially compiled for the readers of PLATING; here the world in which we work and operate is stripped of its veneer, cleansed of its distortions and carefully degreased of superfluities.)

Six million pounds of nickel are to be diverted to industry during November and December.

Chlorophyll may be useful to prevent metal objects from tarnishing, according to *Chemical Research Laboratory* in Teddington, England. Paper impregnated with chlorophyll (which absorbs traces of H_2S from the air) must merely be placed in contact with the metal to prevent attack.

New zirconium alloy (called Zircaloy-2) has been developed at *Westinghouse Electric Corp.* The alloy is said to be so resistant to extremely corrosive action of high-temperature, high-pressure water in nuclear reactors that in a year's time only 10,000th of an inch of corrosion can be measured.

ALUMINUM—(99 per cent pure plus ingot)	24.40
CADMIUM—(Platers' quotation)	$170.00
CHROMIUM—Electrolytic Cr. (99 per cent), Fe (0.3 per cent max), C (.20 per cent max)	$1.30
Carloads (ton lots)	$1.32
COPPER—Electrolytic, domestic	43.00
GOLD—(per oz U. S. price)	$35.00
LEAD—(Common, New York)	15.50
MAGNESIUM—(Ingot, F.O.B. Newark)	34.70
(Sticks, 1.3 in diameter, 100 lbs or more)	53.00
MERCURY—(per 76 lb small quantities)	$275.00-$280.00
NICKEL—(F.O.B. Port Colborne U. S. Duty Included)	64.50
Electrolytic Cathods (sheets loose)	64.50
PLATINUM—(refined per oz)	$91.00-$95.00
RHODIUM	$1.20-$1.25
SILVER—New York (per oz)	90.50
TIN—New York	96.125
ZINC—Hygrade (delivered)	14.35

Diffused-junction silicon rectifier, rated 200 amp at 80°C, will be produced soon by *Nat'l Semi-Conductor Prods*, Evanston, Ill. First units will be rated for 60-v operation, then 175-v and 350-v.

Australian research found that heating chromium in nitrogen at as low as 700° C produces brittleness, with the depth of embrittlement increasing with time of heating in nitrogen at a certain temp.

French self-truing grinding machine compensates for abrasive removal: machine for grinding centers of high-powered mandrels in vertical position has an automatic truing device which operates after each stroke, and a gear in a spindle head which advances the wheel by a distance equal to the amount of material removed from the wheel during truing.

Burnamite was advertised by *Rutley Indus.*, N. Y. as the "revolutionary new" burnishing and tumbling formula specially developed to produce the color, luster and finish you want on zinc die castings. It is available in homogeneous powder form.

Cavitation attack in ultrasonic equipt: Characteristics of ceramic transducers; ways of protecting transducer electrodes, resistance of different materials in coatings to cavitation.

"Metal gathering" is a process used by *Thompson Prods Inc.*, Bell, Calif., to make high-strength metal parts with enlarged ends or central sections. It differs from upsetting in that the length of stock which can be accumulated in the gathered mass is theoretically unlimited. A hydraulic ram feeds stock into the "gather zone" through a split upper contact which acts as 1 of 2 electrodes, and rests upon a lower platten which serves as the 2nd electrode. A current heats the metal to a plastic state, then pressure is applied to force the metal into the desired shape. Metals thus fabricated: tin, titanium, aluminum and alloy and stainless steels.

Alloy plating: evaluation of available alloys and plating methods, properties, advantages and limitations, basic plating procedures, etc. The copper-tin (bronze) alloy is a corrosion-resistant undercoating with better throwing power and higher rates of deposition than copper.

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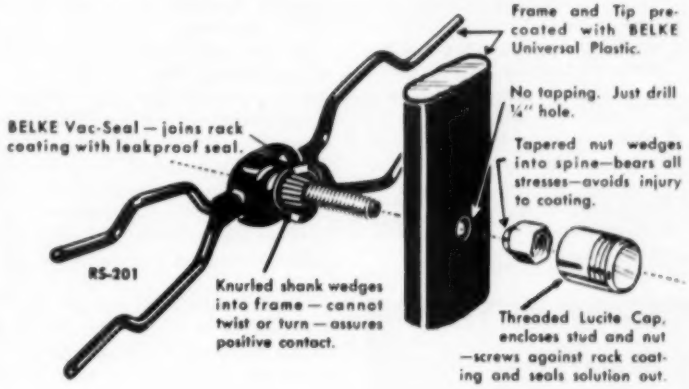
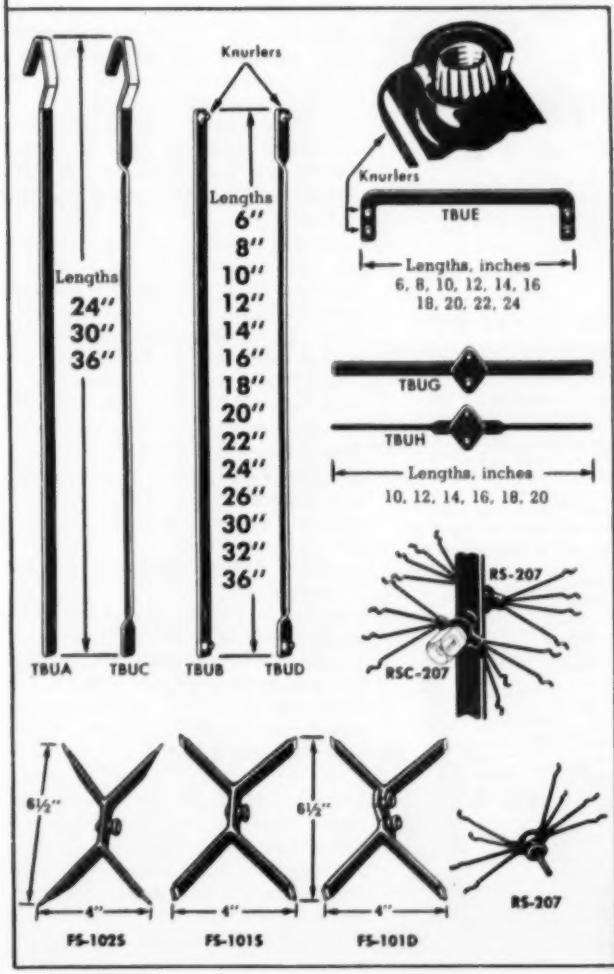
You can be ready to plate in minutes


Frame and Tip pre-coated with BELKE Universal Plastic.
No tapping. Just drill ¼" hole.
Tapered nut wedges into spine—bears all stresses—avoids injury to coating.
BELKE Vac-Seal—joins rack coating with leakproof seal.
RS-201
Knurled shank wedges into frame—cannot twist or turn—assures positive contact.
Threaded Lucite Cap, encloses stud and nut—screws against rack coating and seals solution out.



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When Thinker Boy Racks are no longer needed *they do not become useless as do other racks*–

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With an accumulation of Thinker Boy Members and Tips, *you can have specially designed racks for the mere cost of assembly*–be ready to plate a new job efficiently in minutes or hours instead of days or weeks.

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Thinker Boy affords amazing advantage in efficiently meeting widely varied racking needs.

You can assemble racks of just about any style or type. You can have the exact tip arrangement and spacing that suits the job. *You can adjust Thinker Boy Tips to hold an unbelievable variety of articles.*

New literature, just off the press, shows how. Illustrated Thinker Boy Rack Members and Thinker Boy Tips. Shows how to assemble many different types of racks and how to adjust standard Thinker Boy Tips.

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EVERYTHING FOR PLATING PLANTS

TRADE LITERATURE

L—1112. Price List on pH Equipment—The Bristol Company of Waterbury, Conn. has just released a new price list and specification bulletin on their pH recorders and controllers for use with Beckman electrodes and amplifiers. Specifications are written to enable a user to select the pH indicating, recording, or automatically controlling equipment best suited to his particular needs.

Included are Electronic Dynamaster Potentiometers in electric, pneumatic and program control models, as well as Bristol-Beck control systems. Indicating millivoltmeter electric controllers are also offered. Noncontrolling models include round and strip-chart recorders with one and two continuous records, and strip-chart multiple printing models, as well as indicating millivoltmeters.

L—1113. Fans—A new two-color illustrated four-page catalog (Bulletin No. 7214) describing Model B and Model E Ventura Fans for commercial and industrial ventilation is now available from American Blower Corporation. Model B fans are for commercial and light-duty industrial exhaust installations; Model E fans are recommended for heavy-duty industrial applications.

The new catalog discusses features of the V-belt-driven fans and their application. Tables of performance data are included which list electrical power requirements, delivery ratings at different static pressures, fan speed, motor horsepower, nominal rotor diameter and net weight for each of the eight different sizes in the Model B line and the eight units in the Model E line.

Installation drawings are included in the new catalog giving basic dimensions for the Model B and Model E fans.

The only filter on the market you can LEARN TO OPERATE IN ONE MINUTE!
CLEAN COMPLETELY IN LESS THAN 15 MINUTES!
Sel-Rex
DOUBLE DUTY FILTERS
Cuts filter cleaning time to less than 15 minutes
No filter on the market can be completely cleaned and reassembled as fast as a Sel-Rex DOUBLE DUTY Filter.
The entire Annular element is secured to the tank cover—lifts out freely and easily for cleaning, either by hand or with the sturdy, hand-operated davit mounted on the tank of larger units. Messy handling of wet and dirty elements is eliminated—you can even clean an element used for carbon treatment without soiling your hands!
Other outstanding advantages:
Completely new Sel-Rex-designed mechanical seal pump sharply reduces maintenance. Pump seal replacement method has been simplified.
The compact design saves valuable shop space . . . the new Annular element gives DOUBLE the amount of filtration area and speed in the same space required by other filters. All Sel-Rex DOUBLE DUTY Filters can be used with either the new Annular element or porous stone—no additional parts are required for conversion.
Standard models from 250-18,000 GPH capacity
Larger models built to specification.
So simple to operate — You can learn to perform ALL filtering operations in less than ONE minute—precoat . . . filtering . . . backwashing . . . or liquid transfer — even if you've never operated a filter before. Simplified, easy-to-read instructions are fastened to the front of the tank — can be read when operating valves are used. Valves are conveniently located, colored and numbered for quick identification.
WRITE TODAY FOR ADDITIONAL INFORMATION OR QUOTATION
Sel-Rex
BART-MESSING CORPORATION
229 Main Street, Belleville 9, New Jersey
Newark Detroit Los Angeles

L—1114. Finishing Recommendations—Stevens Technical Bulletin PP-125 on "Successful Stevens L.V.* Finishing of Aluminum and Zinc Base Die Castings" describes finishing recommendations made by Frederic B. Stevens Customer Service Laboratory for many die cast items ranging from automotive door handles to camera range finders.

The recommendations which include type and size of buff or wheel, minimum number of operations required, wheel speed, necessary abrasives or compositions, etc. were culled from files of recommendations made to leading manufacturers requesting the L.V.* (Laboratory-Verified) Report services of the laboratory.

The bulletin also explains how other manufacturers may avail themselves of the L.V.* Report services in determining methods and materials that would reduce finishing costs and improve final finish.

L—1115. Rustbond Primer No. 6—The release of a new, easily applied primer, known as Rustbond Primer No. 6 has been announced by the Carboline Company, formulators and manufacturers of quality protective coatings.

This new primer has a drying time of 10 minutes at 85 degrees F, enabling faster scheduling and time utilization of painting crews with resulting lower application costs. Rustbond Primer No. 6 can be used over wirebrushed, rusty steel, sandblasted steel and clean cold rolled (bright) steel and applies at a dry film thickness of 2 mils with a coverage of 230 sq ft/gal.

Showing excellent resistance to alkalies and acids and good resistance to solvents, Rustbond No. 6 will improve the topcoat performance of maintenance vinyls, phenolics, alkyds, chlorinated rubbers, one package neoprenes, oil base paints and furans. Important is the fact that Rustbond Primer No. 6, being compatible with all these topcoats, will eliminate the necessity of carrying many different primers in stock. Consequently, a company can carry a much lower paint inventory since only one primer need be stocked.

L—1116. Tubing—Various applications of cold drawn Electricweld tubing are described in a new four-page color brochure recently prepared by the Jones & Laughlin Steel Corporation. The informative brochure describes the product, which has a mirror-like inside finish and how it is manufactured to close tolerances. Specifications also are listed.

L—1117. Hydroxyethyl Ethylenediamine Triacetic Acid—A technical bulletin on Chel DM Acid has been published by Geigy Industrial Chemicals. It gives valuable information on characteristics, chemical and physical properties of hydroxyethyl ethylene-diamine triacetic acid.

FISHING FOR WAYS TO CUT ELECTROPLATING COSTS?

KNICKERBOCKER FOUND IN TEST THAT IT CAN

- **Cut cost of solution correction**
- **Cut Power Costs by 1/3 or Boost Production**

WITH

"PLUS-4" ANODES

(PHOSPHORIZED COPPER)

The Knickerbocker Electrotype Co. of New York filled its Tank No. 1 with AnacondA "Plus-4" Phosphorized Copper Anodes, set up Tank No. 2 as a control, using only electric tough pitch copper anodes. Solution concentrations are tested and corrections made weekly—and consistently Tank No. 1 with the "Plus-4" Anodes has shown the better record.

After five months of testing, Mr. William Welsh, foreman of the plating department, expressed his satisfaction with "Plus-4" Anodes and made this statement: "Using regular anodes, we must hold our cathodes at least 4½ inches from the anodes. This is necessary because the sludge from the old anodes will fall on our work and cause roughness. With the new 'Plus-4' Anode, there being no loose sludge, we could work much closer—only 3 inches away—which would reduce the resistance by ⅓—which would in turn reduce our power costs by about the same proportion. This would also reduce the heat generated by a like proportion."

Mr. Welsh explained that because Knickerbocker uses thermoplastic molds, heat is important—the tanks must run no higher than 95F to prevent warping. As an alternate to reducing power, he explained that he could use the same power and run plates through faster, increasing production. 86142

WHY PLATING WITH "PLUS-4" ANODES COSTS LESS!

+ **1** no anode sludge (no "bagging" or diaphragms required)
+ **2** no copper "build-up" in solution
+ **3** smooth, heavy cathode deposits
+ **4** up to 15% more cathode deposit per anode

SEE FOR YOURSELF — For details on how you can get a test supply of "Plus-4" Anodes sufficient to fill one tank, write to *The American Brass Company, Waterbury 20, Conn.* In Canada: *Anaconda American Brass Ltd., New Toronto, Ont.*

"PLUS-4" ANODES

A PRODUCT OF

ANACONDA®

made by The American Brass Company

For use under Patent No. 2,689,216

Here is a "Plus-4" "fish" pulled out of a Knickerbocker tank. It measures .170" at the thickest part at the bottom and .058" at the thinnest point. This remnant of a 40-lb. anode weighs only 2 lb., 3 oz. "Plus-4" Anodes corrode this way regularly—another indication of the superior job they can do for you.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1131.

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- Crown Rectifiers
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TRADE LITERATURE

L—1118. Al_2 as a Conductor—The use of aluminum bus bars in both feeder and plug-in or trolley busway distribution systems is described in a new two-color, 8-page bulletin issued today by the Distribution Assemblies Department of the General Electric Company.

The publication lists the advantages resulting from the use of aluminum as a conductor in busway applications. It explains in detail construction features, operating characteristics, and specifications.

L—1119. Non-Touching Meter—The proximity meter, a precision electronic instrument that measures without touching the specimen, is described in a new 28-page booklet offered free by the manufacturer, Fielden Instrument Division of Robertshaw-Fulton Controls Company.

The new booklet, according to the instrument company, is aimed at helping industry and research installations find solutions to a wide variety of problems in precision measurement.

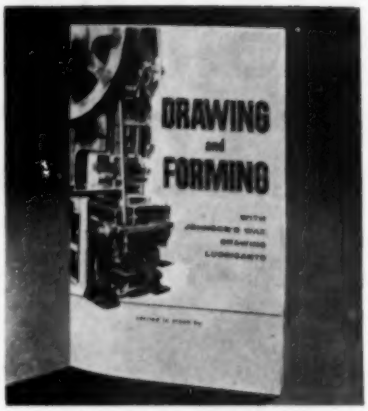
Of outstanding flexibility, the instrument can detect a change in temperature of one thousandth of one degree centigrade, or variations as minute as one millionth of an inch.

For use in specialized measurements, the proximity meter will determine vibrations of one millionth of an inch in amplitude at frequencies from 0 to 20,000 cps moisture content of 300 parts in one million; and pressures of one hundred thousandth of an inch of water.

The operating principle of the device is based on electrical capacitance, or measuring the changes in the electrical field located between the specimen and the electrode of the instrument. These measurements are interpreted on a convenient scale.

Also described in the booklet are applications of the proximity meter as a non-contacting micrometer (internal and external); concentricity gauge; surface finish gauge (internal and external); strain gauge; torque meter; vibration meter; automatic weighing; breaking strain gauge; paint or insulation thickness gauge; micro thermometer; pressure gauge; and moisture content or product composition by means of dielectric measurement.

L—1120. Magnetic Null Indicator—A new two-page bulletin describing the Magnetik Null Indicator, a portable temperature measuring instrument manufactured by Minneapolis-Honeywell's Doelcam division, is now available. The bulletin provides complete engineering data on the low-level, linear-deflection d-c null indicator. Included in the bulletin is a technical description of the engineering concept of the division's second harmonic magnetic converter covering such features as isolated input, immunity to 60-cycle pick-up, and rugged design.



Waxes Lubricity and Metal

L—1121. Wax in Drawing and Forming—A new booklet explaining the functions and advantages of wax in the metal forming operation has been published by the Johnson's Wax Company. It gives reasons for wax's unusual lubricity and explains the benefits of wax in metal forming.

The booklet explains the physical function of wax during the drawing operation and tells why wax provides vital lubrication especially under extreme pressures and high temperatures when other lubricants fail to function. Industrial waxes, the booklet states, can withstand pressures as high as 200,000 psi and withstand temperatures in excess of 450°.

Of unusual interest is the explanation of the part that polar attraction plays in keeping the wax lubricant on the die and blank surfaces.

Case histories are cited to illustrate scrap reductions made possible by the efficient lubrication of wax. Other case histories tell of additional economies such as reduction of scrap, elimination of drawing steps, reductions in down time and increases in die life.

L—1122. Anti-Corrosive Water Treatment. The Permutit Company has announced the availability of an informative catalog sheet CS-101, Preventing Corrosion of Drinking Water Lines.

The bulletin details a new service which stops "red water troubles" and prevents the destruction of piping, thus reducing maintenance and replacement costs. It is available to industrial buildings, apartment and office buildings, department stores, theaters, in fact any large consumer of water.

This service consists of treating incoming water supplies in order to make them non-corrosive. Chemicals such as one-tenth of a pound of sodium silicate per 1000 gallons are added to the raw water through a chemical feeder mechanism in order to prevent corrosion of lines. These minute dosages of chemicals are noninjurious to health and are very effective corrosion inhibitants.

L—1123. Catalogue of Plastics—A new condensed catalogue of plastic welding and spraying equipment, large plastic moldings, weldments and component parts for welded fabrications, has just been published by the American Agile Corporation.

The free literature details the company's seamless ducting, sheets, rods, bars and blocks of Agilene (polyethylene), Agilene HT (high-temperature, high-tensile polyethylene), Agilene IHT (irradiated polyethylene), and Agilide (unplasticized polyvinyl chloride).

Dimensions, thicknesses, inner and outer diameters of pipe and tubing, and weights of the various stock pieces of all four materials are detailed in charts and tables. The literature is fully illustrated. All material is arranged for quick, convenient reference.

L—1124. Electric Proportional Control—Bulletin 4-11, offered by The Foxboro Company, describes the company's complete line of electric proportional controllers widely used for control of dew point, pressure, temperature, etc., in batch process, combustion atmosphere and heat treating furnace applications.

Operated with any Foxboro mechanical or electrical measuring system, the instrument consists of an electric control unit, a measuring element, and an indicating or recording mechanism within a standard rectangular case. The controller is connected to an electric-motor valve operator or magnetic contactor through an electronic relay.

Available on request, the 4-page bulletin explains the functions of three types of electric control: proportional plus manual reset; proportional plus automatic reset; and proportional-set average-position. Explained, too, are the design features that eliminate slidewire friction so that accurate measurement and precise control action are assured.

Separate sections are devoted to the electric-operated control unit, the electronic relay and the valve operator. Among the illustrations are typical installation views and an actual chart record showing temperature control of an electrically heated furnace.

L—1125. Welding Specs—A four-page specification describing requirements and procedures for furnace copper brazing in accordance with MIL-B-7883 has been issued by Superweld Corp., North Hollywood, Calif.

The company's process for furnace copper brazing, known as Superwelding, is a thermal process for permanently joining two or more ferrous metal parts under high temperature in an electric furnace. Union is accomplished by intermolecular bonding between the parts using fused filler metal with a melting point below that of the base metal. The specification covers equipment, material, process, and quality control.

GOOD PLATING IS VITAL

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HELP YOU GET IT

In the field of electroplating, or any finishing of consumer goods for rust prevention or appearance, it has become increasingly recognized that modern automatic plating equipment is essential in any progressive plating plant in order to secure the desired uniformity of product, quality of finish, efficiency and economy of operation.

The Meaker Company is proud of its contribution in the development and advancement of the art and science of electroplating and to the development of modern electroplating equipment. Meaker continues to specialize in research and development work and to offer to the electroplating industry its extensive, practical experience and skill for improving production technique and for solving production problems in the plating field.

Call or write today and have a representative from our nationwide sales and service organization survey your problem with you at no obligation.

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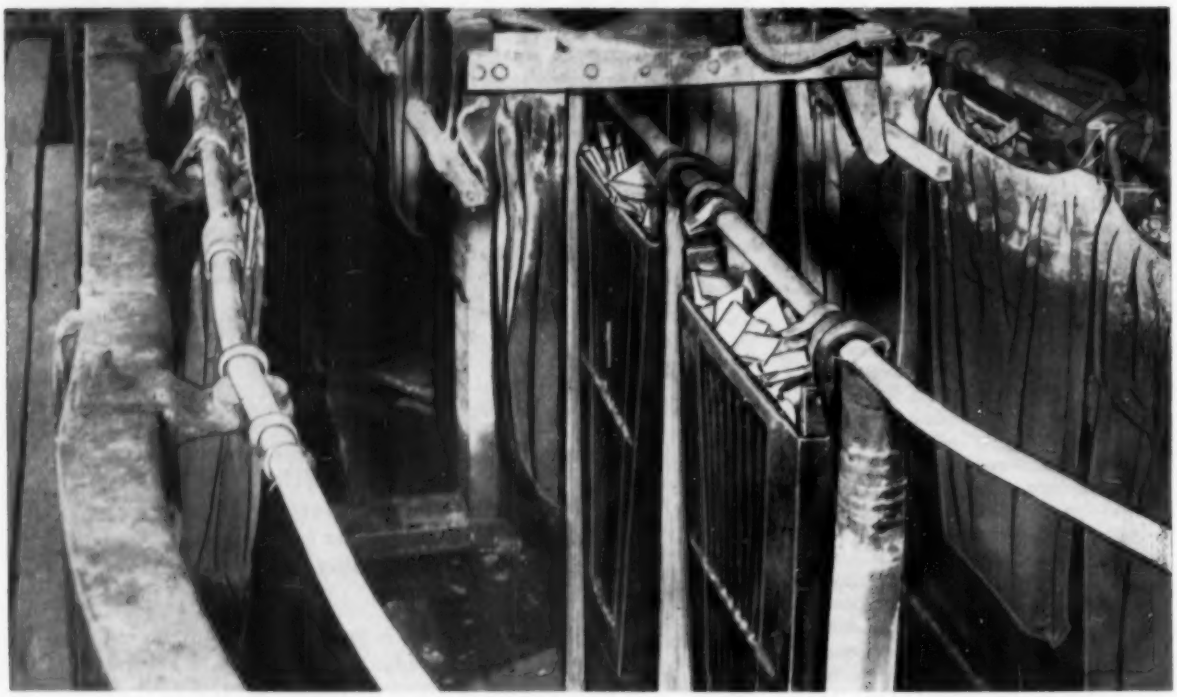
• Full Automatic and Semi-Automatic Plating Machines • Strip Steel Plating Equipment
• Wire Galvanizing Equipment • Batch Type Plating Machines • Pickling Machines
• Processing Conveyors • Motor Generators for Plating • Rectifiers for Plating

LOOK INTO THESE ANODE SAVINGS!

Loss from discarded odds and ends of anodes may seem trivial—but let's face it—the loss annually adds up to important money. For instance: the case of the 7,000 gallon full-automatic plating machine shown below! Here, 60 FORCITE ANODE BASKETS GIVE AN ANNUAL SAVINGS OF $7,200.00!



According to this plater's production records, the machine uses 6,000 lbs. of anodes per month. The 60 baskets make possible the use of less costly anode material which results in an annual saving of $7,200.00 in material. This saving is DOUBLE THE ORIGINAL COST of the baskets and equals a return of 200% on the investment!

Of interest to smaller plating installations is the fact that Forcite Anode Baskets produce proportional savings wherever used. In addition to important anode savings, they give greater anode area, smoother deposits, pass more current, permit larger loads. Every bath, with the exception of Chromium, needs this modern money-saving plating aid! Available in 18, 24, 30 and 36 in. lengths; other lengths on special order.

FORCITE CORPORATION, 31450 Shaker Blvd., Chagrin Falls, Ohio

JUST PIN THIS COUPON TO YOUR LETTERHEAD!

There's no obligation to find out how a small investment in Forcite Anode Baskets pays dividends—year after year!

FORCITE CORPORATION
31450 Shaker Blvd.
Chagrin Falls, Ohio

Yes, send details on FORCITE ANODE BASKETS!

Name..... Title.....
Company.....
Street Address.....
City..... Zone..... State.....

TRADE LITERATURE

L—1126. Metalweld Metallizing—The application of, uses for and benefits to be obtained with metallizing are presented in a four-page, two-color, illustrated folder recently published. Included is a section entitled "What The Metallizing Process Can Do For You" which contains photos, drawings and descriptive copy on the many applications throughout industry for metallizing. The folder also contains a description of the process itself as well as important data on a spraying technique which saves considerable time and permits work on jobs that could not be done before. Uses for the various types of metals applied in metallizing are given as well as information on modern shop and field facilities. Protective Coatings Division, Metalweld, Inc., Philadelphia, Pa.

L—1127. Portable Drill Press—Handy folder describes typical uses for Portomag, the new portable, magnetic drill press issued by Portomag Sales, Inc. Complete dimensions, specifications and weights of eleven standard models are listed.

Portomag drill presses are used by metal working plants for their time and labor saving features. Accurate drilling up to 1½ inches and tapping up to 1 inch is possible by taking the drill to the work. It is no longer necessary to take work to the drill.

L—1128. Dissolved Oxygen Analyzer Literature—Arnold O. Beckman, Inc., have compiled and published a new technical bulletin on the application of the Model 2B2B dissolved oxygen analyzer to modern steam generating plant operations.

Data covered includes basic principles of measurement, equipment required, flow diagrams and descriptions of typical sampling systems for various types of plant set-ups, a flow diagram and detail illustrations of the Analyzer itself, benefits and savings that result, and other helpful technical information of particular interest to fact-seeking power plant personnel.

L—1129. Roller Conveyors—A new catalog on Series 60 medium and heavy duty roller conveyors has just been issued by The E. W. Buschman Company. Twenty pages of data and specifications on the complete line describe the various types giving capacities of rollers and bearings. Detailed cutaway views show the dustproof and grease-packed-for-life bearings with true-labyrinth metal seal, as well as integral and plain ball bearings. The rounded ends, turned-in ends, swaged, and reamed straight ends of rollers are shown in angle frames, formed or structural channel frames, with charts giving roller and frame capacities.

L—1130. Aluminum Windows, New Metal Forming Lubricant—The production of aluminum casement windows at Alvista Metal Corporation's plant in Van Nuys, California, is the subject of a feature article in the September-October issue of Oakite News Service. The story tells how production was increased, costs reduced, by the use of a conveyor and spray system and Oakite materials for automatic etching, brightening, and lacquering of extruded and welded window frames.

A second article discusses the use of Oakite Composition No. 12 for metal forming operations, showing how this relatively non-viscous material leaves no messy deposit on punches or dies, lengthens the time between dressings, extends die life, and is easily removed. A chart shows operations on which the lubricant has been used successfully, type of metal, concentration and application of the material, and results achieved.

L—1131. High Speed Radiamatic Unit—Brown division of Minneapolis-Honeywell offers bulletin 9320 which describes a new high speed radiation detector. The detector responds to 98 per cent of any temperature change in less than ½ second. Applications, features and specifications are given.

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TRADE LITERATURE

L—1132. Pumping Corrosives—Vanton Pump & Equipment Corp. announces the availability of a new bulletin describing the handling of corrosives at Litho Chemical & Supply Co. The bulletin describes the use of the Vanton pump for a variety of solutions including hydrochloric, formic and lactic acids as well as zinc and calcium salt solutions. Copies available on request.

L—1133. Electric Tool Catalog—A new 25-page 1956 catalog issued by Porter-Cable Machine Co. describes 52 portable electric tools and kits with over 400 accessories for builders, carpenters, plumbers and electricians. Industrial maintenance men, heating and air conditioning contractors, repair men and specialty trade workers will also find this a valuable guide to power tools. This free book includes 150 pictures of tools and their uses with complete specifications and prices for electric saws, sanders, drills, planes, routers, shapers, combination tools, grinders, hedge shears and grass trimmers.

L—1134. Industrial Movies for Public Consumption—As a public service to schools, social organizations, libraries, etc., The Colorado Fuel and Iron Corporation has made available eight 16 mm sound color movies describing the production of steel, and important finished products. The manufacture of rails, wire rope, grader blades and reinforced concrete is pictured as well as the manufacture of products essential to the mining, agricultural and construction industries.

All of these movies are available on a free loan basis, and can be obtained from The Colorado Fuel and Iron Corporation.

L—1135. Conveyor Belts—A wall chart on the proper selection and maintenance of conveyor belting is offered to conveyor users by Hewitt-Robins, Inc. The chart, measuring 23 in x 33 in. contains twelve practical maintenance tips for getting more life out of belts. It deals with storage of belts, correct design of loading chutes, use of automatic switches, lubrication, inspection, and other important aspects of maintenance. The chart also lists the types of belt recommended for various uses, such as mining, metal processing, food processing, chemicals and coal handling in public utility plants.

L—1136. Haveg's Polyvinyl Chloride Items—This 12-page brochure issued by Haveg Corp. gives the latest information on chemical resistance, properties and fabrication procedures. It contains complete specifications, including dimensional charts, on Haveg 1810 pipe and pipe fittings, fume duct and fittings, dampers, weather caps and valves. It also covers special fabricated items, including fume hoods, self-supporting rectangular and cylindrical tanks and lined tanks. Haveg 1810 is being used in metal plating, chemical processing, x-ray developing and other applications where high chemical resistance is needed.

L—1137. Dust Collector—A wet dust collector that separates dust from the air by centrifugal action while it also wets and traps dust by water is described and illustrated in a new bulletin from Dust Suppression & Engineering Co. The Type "W" Air Tumbler consists of a stationary screw within a horizontal pear-shaped barrel.

Dust-laden air enters at one end of the barrel under suction of an exhaust fan connected to the outlet at the opposite end, or the fan can be installed ahead of the Air Tumbler and the air forced through under pressure. During its flow within the barrel, the dust is continuously centrifuged through four revolutions along a helical path formed by the screw.

Water in the lower portion of the barrel is swept up by the air stream in a sheet that flows around the periphery of the barrel.

L—1138. Distilled Water Bottle Pump—Barnstead Still & Sterilizer Co.'s new bulletin describes how the bottle pump pumps out distilled water from tank or carboy while permitting only purified air to enter. This is accomplished by the special Ventgard filter which removes and absorbs various impurities from the incoming air which replaces the liquids being drawn off.

The bulletin describes how the Ventgard filter removes particulate matter as small as 0.2 micron. Bacteria such as tuberculosis, diphtheria, typhoid, tetanus are prevented from entering the container as well as vapors, alkali, and acid gases.

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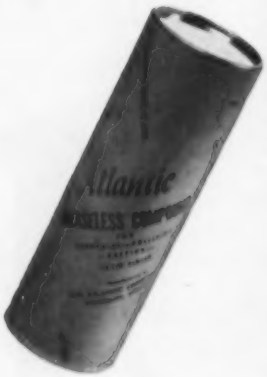
in the finishing of

METALS, PLASTICS, & WOOD.



Economy-pak foil lined, fibreboard container

ATLANTIC GREASELESS COMPOUNDS are produced by specialists with a background of long experience in the compounding and application of greaseless finishing materials.

The rigidly controlled uniformity of ATLANTIC COMPOUNDS helps you maintain your high finishing standards. This dependable uniformity is assured by the highest grade ingredients and by extremely close quality control in manufacturing.

Devoted exclusively to producing unexcelled greaseless compounds, Atlantic maintains constant research striving for continually improved products. Technical assistance and data available upon request.

Aluminum Tube

THE ATLANTIC COMPOUND CO.

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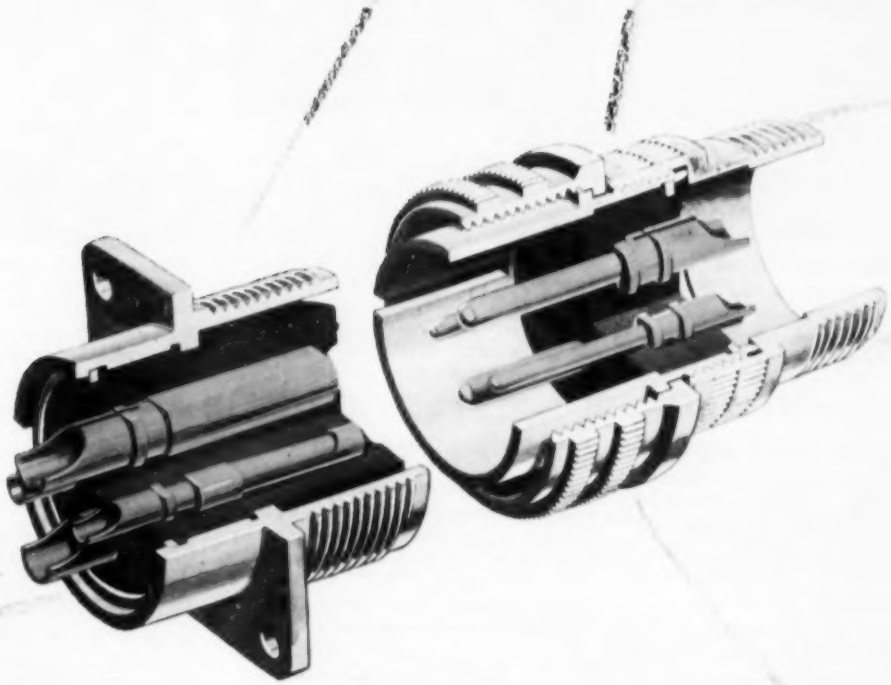
Sel-Rex®

BRIGHT GOLD PROCESS



Simplicity of operation... uniform, high quality performance... characteristics that cannot be achieved with any other gold plating process—these are just a few of the reasons why American Phenolic Corp. uses the Sel-Rex BRIGHT GOLD PROCESS to electroplate high quality AMPHENOL AN Connector contacts.

Packaged in 1, 5 and 10 ounce bottles

Here are the advantages of plating electrical contact surfaces with the Sel-Rex BRIGHT GOLD PROCESS:

LONGER LIFE—the extreme hardness of the deposit, twice that of conventional gold plating, resists wear and abrasion, even on sliding or wiping contacts.

IMPROVED PERFORMANCE – the smooth, fine grained deposit assures a superior contact surface, both electrically and mechanically.

GREATER ECONOMY—uniform metal distribution, even in deep recesses and interior surfaces, gives greater protection with less gold. The solution operates at room temperature and is simple to maintain.

BETTER APPEARANCE—the mirror-like finish will not corrode or oxidize – each part maintains a like-new appearance and has indefinite stock life.

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Dept. PL.11, 229 Main Street • Belleville 9, N. J.

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☐ Mail information on *SEL-REX* Silver Sal-U-Salt, Gold and Rhodium.

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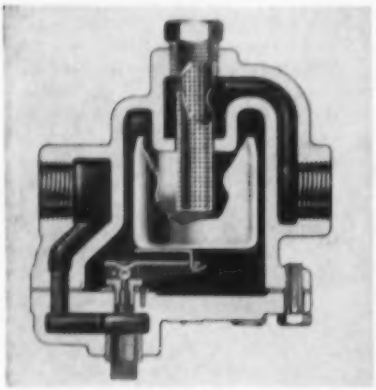
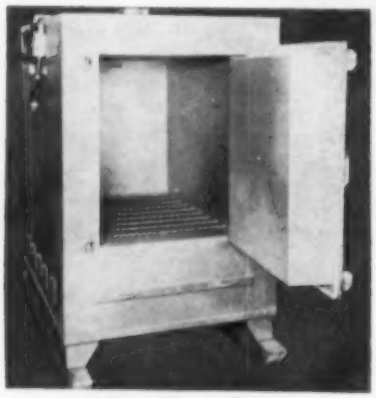
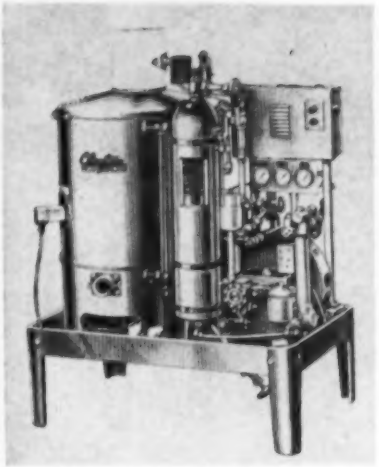
EQUIPMENT AND SUPPLIES



Steam Trap



Griese-Hendry Oven



Balanced Feed

E—1139. Bucket Steam Trap Withstands Loss of Prime—The possible loss of prime with consequent blow-through of steam is a well-known inherent weakness in all inverted bucket steam traps.

Sarco offers a new design which is claimed to be superior in retaining prime under the most difficult operating conditions: light loads, rapid pressure drops, and partial vacuum in the return line caused by night shut-downs.

E—1140. "Lab" Model Filter—Increased filtering capacity in a compact space, simplified operation and quick, convenient maintenance are claimed for the new portable Sel-Rex "Streamliner" filter, introduced by Bart-Messing Corporation, of Belleville, N. J.

Designed for use in the laboratory, small production shop or pilot plant, the Sel-Rex "Streamliner" has a capacity of 250 gph and can be used with either the new Sel-Rex Annular element or a porous stone element, for either acid or alkaline solutions. The unit stands 14 inches high, measures 14 inches square at the base, and weighs only 45 pounds.

This new filter can also be used without any filter aid by placing the new Sel-Rex disposable paper cartridge over the standard stainless steel Annular element. The manufacturer states that the disposable paper cartridge greatly simplifies the reclamation of precious metals from the filter cake and, since it eliminates filter bags and filter aids, cuts cleaning time up to 90 per cent.

E—1141. Detergent—Clayton K-10 Steam Cleaning Compound, a heavy-duty industrial steam cleaning detergent with important advantages in efficiency and economy, is a new development of the Clayton Manufacturing Company of El Monte, Calif.

E—1142. Gas Fired Oven—This oven was especially designed and built to meet the needs of industry for operations that require an oven with adjustable temperature control from 100°F to 1000° F. Because of the wide range of temperature adjustment, it has been found especially practical for operations such as burning off old insulation on electric motors and baking on new varnish after rewiring.

Construction is all steel—a cabinet within a cabinet—with 5 inches of Rockwool insulation. Gas burners at the bottom of the oven supply the heat. A heavy-duty grate is built in over the heating system. Partlow temperature controller included as standard equipment. The oven can be built for heating electrically.

Size of work space is 26 inches x 30 inches x 30 inches deep. Other sizes and specifications to requirements.

E—1143. Cold Chemical Coating For Aluminum—A new cold chemical finisher has been perfected for aluminum coating by the Birchwood Chemical Company, Minneapolis, Minn.

Called Alumblack, the formula gives a soft or high gloss finish immediately upon application. Only 1 minute is required for drying.

The surface tension of Alumblack is very low which means it can be dipped, sprayed or applied with a rag or brush. There is no surface spotting or density variation and if left unrubbed a dull glass finish is obtained. If rubbed, a high-gloss, satin-smooth finish will result. Either is a beautiful saleable finish.

Inasmuch as Alumblack penetrates the metal surface, there is no measureable tolerance deviation.

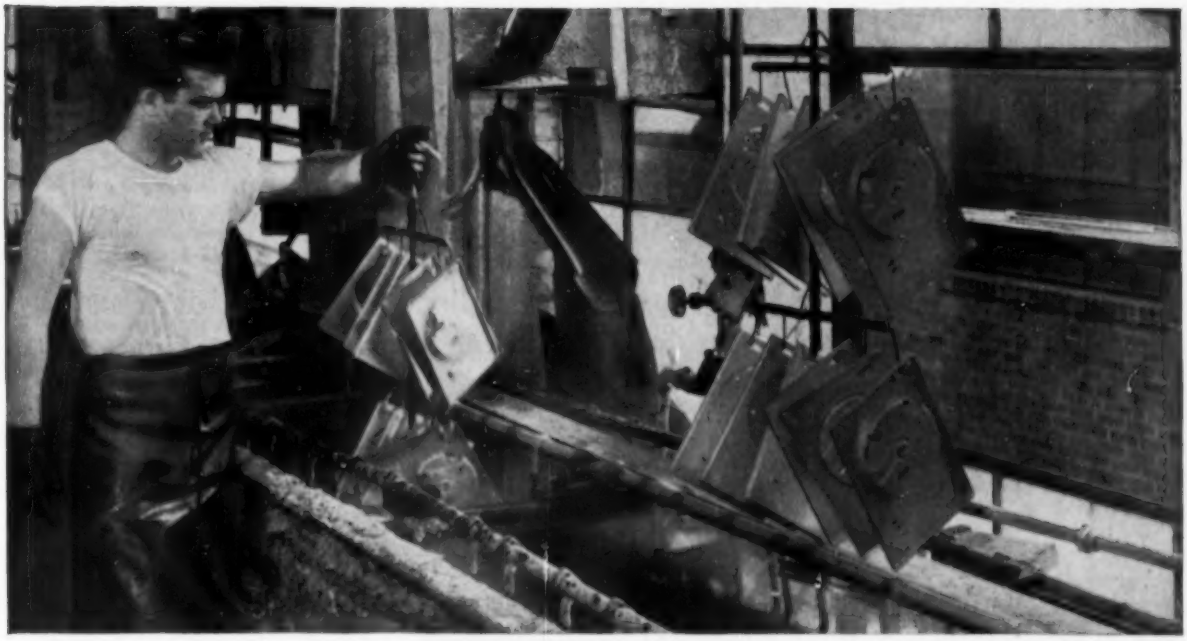
Alumblack has a definite anti-corrosive factor, but Birchwood Chemical has not yet obtained complete information about these characteristics of the formula.

Principal use for Alumblack as suggested by the manufacturer is in retouching and for the fabrication of small parts.

E—1144. New Low-Priced Steam Generator—While balanced feed is not new in itself, its adaptation to the new Clayton 15 hp unit represents the first successful application of balanced feed to a steam generator of the automatic, forced circulation type. Balanced feed means that as the generator is operating, cold water entering the system from the supply source is never admitted directly to the coils, where it reduces the head level of the entire system and induces scale formation. Instead, as steam is taken off and the hot water in the accumulator drops to a fixed level, an automatic control admits unheated feedwater into the accumulator. The temperature of the feedwater is abruptly increased. At the same time, the feedwater is subjected to thermal shock, which encourages precipitation of solids. Thus, the water entering the coils is pre-heated and simultaneously freed of much of its mineral content. Operating efficiency is increased, while scaling is avoided.

E—1145. "U" Type Quartz Immersion Heater—The Glo-Quartz Electric Heater Company, Inc. is now presenting its line of new and exclusive "U" Type Quartz Immersion Heaters. This new electric radiant translucent fused quartz immersion heater was designed to solve the difficult problems encountered in the heating of acid electroplating and pickling solutions.

Exhaustive tests in many industries over a period of time have proved the remarkable advantages and economies of this revolutionary new heater. Among these advantages are: 1. Heats instantly. 2. 100 per cent short-proof construction. 3. 100 per cent Thermal and shock-proof construction. 4. Greater accuracy. 5. longer life.



Placing phonograph motor boards in copper plating bath. Plated parts on right are allowed to drain to reduce drag-out.

"Du Pont Coppralyte® gives the speed and throwing power we need for heavy copper deposits"

—Says Edwin McFarland, Supt., Kelly Plating Co.

Plated hubs being removed from rack. Bore is unplated and will be carburized.

"Baths made up with 'Coppralyte' plating salt are economical, too," Mr. McFarland continues. "And they're easy to make up and maintain with the prepared salts. That's why they've been our choice for over 8 years."

At its Cleveland plant, Kelly Plating Co. plates 3,000 bicycle hubs and 3,000 phonograph motor boards per eight-hour shift. The heavy copper coating on the hubs serves as an undercoating for subsequent nickel and chrome plating. A lighter deposit on the motor boards prevents rusting and forms a base for attractive finishes.

Kelly Plating's trouble-free experience can be yours too—whatever your particular copper plating needs may be. You'll find that Du Pont cyanide copper plating chemicals can meet all your requirements for high-quality results and economical operation.

Call your District Office for more information about Du Pont plating processes and chemicals or mail the coupon below.

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☐ Cadmium Plating ☐ Tin Plating
☐ Zinc Plating ☐ Copper Plating

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EQUIPMENT & SUPPLIES

The manufacturer guarantees that the "U" Tube element will not burn out within a period of one year and should last several years under normal usage.

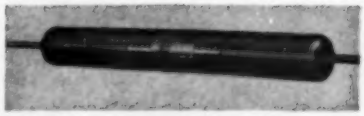
Greater accuracy in controlling bath temperatures is now possible with the new Glo-Quartz "U" Type Immersion Heater when used with a thermostat, because there is virtually no thermal lag between thermostat and heater.

This heater consists of two interchangeable components: The "U" shaped quartz heating element and the combined junction box and guard assembly. The resistance heating element is mounted inside the "U" shaped quartz tube and the coil is firmly supported with a special heat-conducting powder. Hermetic sealing locks out acid fumes.

The "U" tube element rests, at the top, on a special neoprene gasket which absorbs mechanical shock on the guard, thus protecting the tube from damage when it is mounted in the tank. This is in contrast to conventional straight type quartz tubes which are anchored at the bottom to the guard, where mechanical shock is directly transmitted.

More wattage is attainable with the "U" tube heater than with the conventional straight tube heaters because the two "U" tube elements are mounted parallel to each other. The new "U" type heaters are made in standard voltages and wattages and are available through leading electroplating distributors.

E—1146. Graphite Anode for Assembly on Cable—A new concept in impressed-current cathodic protection has been developed by National Carbon Company, a Division of Union Carbide and Carbon Corp. The system comprises a new "National" NA graphite anode, Type QA, and an assembly technique which fixes the anode on the cable exactly where it is needed.



Graphite Anode

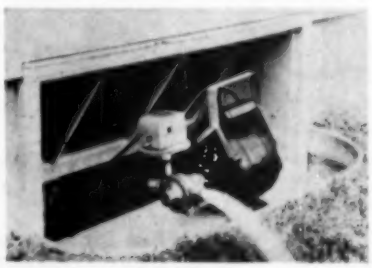
The anodes are attached by means of crimp type connectors on sizes 4, 6 or 8, seven strand cable, at any desired spacing on long cables. They are shipped from stock ready for assembly in three standard sizes: 2 inches x 12 inches, 2 inches x 20 inches and 3 inches x 30 inches.

Type QA graphite anodes were developed for installation in cable ducts. In such applications, the anodes are spaced to provide protection of metallic sheeted cables in adjacent ducts at relatively low current consumption, thereby minimizing interference effects. They also can be assembled at any desired spacing on long cables installed in ditches to protect paralleling bare pipe runs. When bedded in carbonaceous backfill the new anode shows costs comparable with larger graphite anodes plus greater flexibility in installation and generally lower circuit resistance per ampere capacity.

They offer the following advantages: virtually no limitation to size, type or length of cable; lowest circuit resistance per dollar installed cost; optimum anode distribution at minimum cost; lighter and easier to handle; no damage or breakage in shipping; high assembly strength; electrical connection at center of anode.

E—1147. Portable Pump—Designed to combat flooded floors, standing water on flat roofs and for quick, emergency use all year long is a lightweight portable pump built by Hypro Engineering, Inc., Minneapolis, and equipped with a vacuum switch that permits untended operation.

Weighing only 26 pounds complete with motor, hinged carrying handle and vacuum switch, the Hypro Portable has a capacity of up to 5 gal/min with pressures up to 30 pounds. The special vacuum switch guards against burned out impellers by stopping the pump's motor automatically when the liquid supply runs dry.



New Pump

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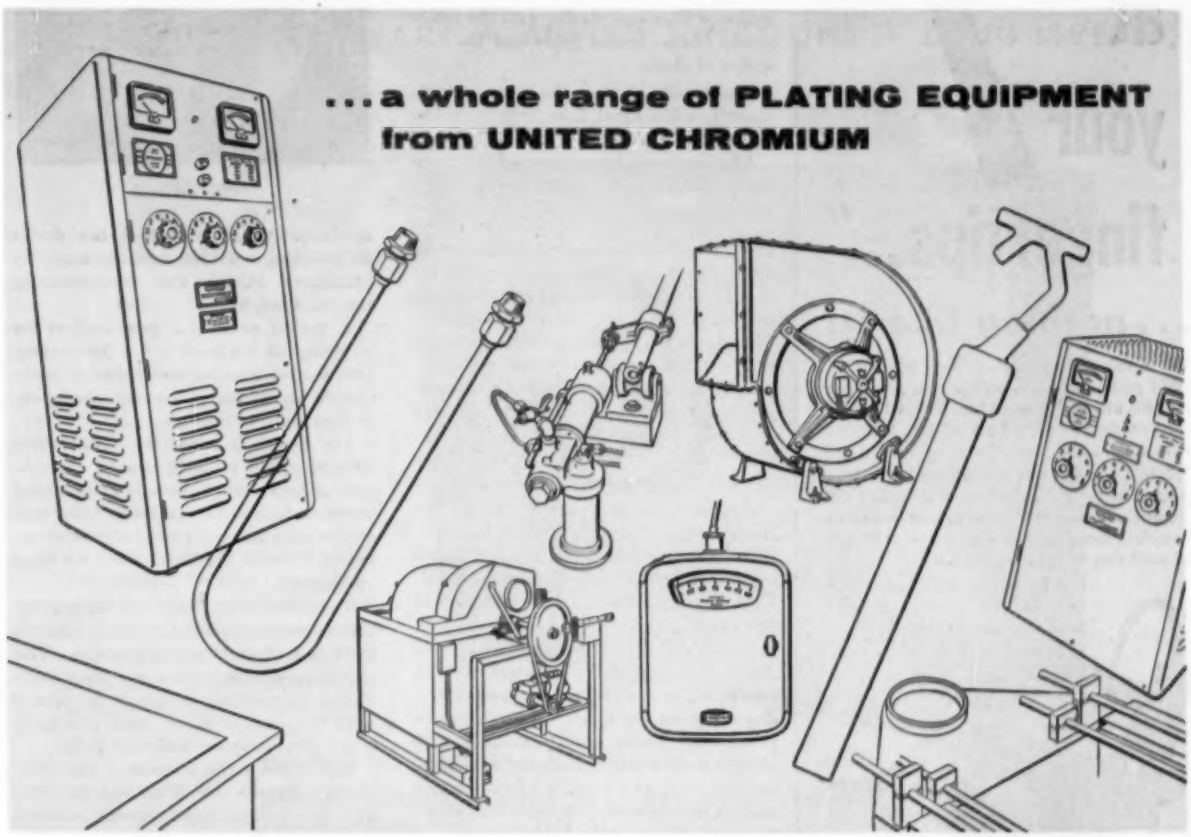
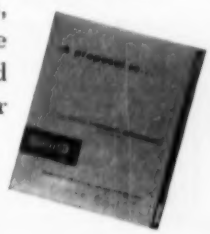


Whether you need one new piece of equipment or a complete installation . . . here's good news for you. The Unichrome name can now be found on *equipment*, too.

That means plenty to platers who have known the kind of time- and money-savings which United Chromium's help makes possible. It means equipment that's right for the job . . . for longer service . . . and for substantial savings that go on year after year.

Ask us for a proposal. We'll be glad to survey your requirements in tanks, rectifiers, anodes, agitators, heating coils, temperature controllers, blowers, and all the other necessities for your operation.



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No indicating solutions, measurement of sample or color matching are necessary.

Completely self-contained in water-proof ever-ready case with shoulder strap.

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Instrument size: 3x5-7/8 x 2-1/2 inches
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EQUIPMENT & SUPPLIES

E—1148. For the Laboratory—A Washable Atomic-Chart—A new edition of its simplified periodic chart of the elements has been published by Fisher Scientific for use in offices and laboratories. Top feature: it is printed on Texoprint, a combination of fiber-and-plastic, with the printability of fine coated paper and the durability of cloth.

The result is that the new periodic chart (1) will not curl, flake, or fray; (2) can be cleaned with soap and a damp cloth.

All atomic weights are corrected to conform with the 1952 international committee values.

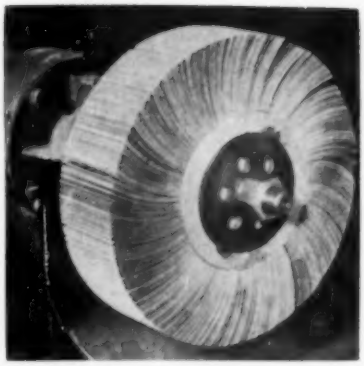
E—1149. Fire Fighter—Introduction of a complete line of easily maneuverable In-Plant Fire Trucks has been announced by the Ansul Chemical Company, Marinette, Wis. Designed to carry a wide assortment of fire fighting equipment and especially adaptable to the needs of plant fire brigades, the trucks are being manufactured by St. Clair Industries of Detroit, Mich. They will be distributed exclusively through the Ansul sales organization.

Employing a Kalamazoo chassis, the trucks are available in six basic models. The KB 8 Model, featuring a 300 lb Ansul dry chemical unit backed up by a 150 gallon water fog system, is expected to find the widest application in industry. Other units utilizing dry chemical-carbon dioxide combinations, water fog-carbon dioxide combinations or solely water are available, depending on the types of hazards to be protected. These units are offered on either a three-wheeled 42-inch wide chassis, suitable for in-plant use, or a four-wheeled 48-inch wide chassis with more road clearance and a larger engine for indoor-outdoor use.

Accessories available on the units include ladders, utility bar, light, hose, portable fire extinguishers and extra nozzles, all mounted with panic-proof, quick release brackets to make their removal by one man simple and fast, even in darkness. An accessory cabinet on the truck provides adequate storage room for fire blankets, boots, air masks, coats, first aid kits, etc.

Trucks are 10 ft long and 5 ft 8 inches high. Prices on the six basic units range from $4,453 to $4,878.

Fire Truck



"PG" Wheel

E—1150. "PG" Wheel—A new device for polishing metal has been developed by Minnesota Mining and Manufacturing Co., St. Paul, Minn.

It makes possible a new method for polishing all types of metal for plating, painting, or architectural finishing, without the use of fine grit set-up wheels, rag or sisal buffs, or brushes.

The device is called the "PG" wheel (polishing and grinding wheel). It consists of hundreds of pieces of cloth coated abrasives factory-formed into a wheel that can be used on rotary or straight line automatics, or on standard lathes for hand operations.

The wheel differs from any other product currently available, in that it removes stock as part of its polishing action. This abrading-polishing action and the wheel's ability to conform enable it to remove mild draw marks in the same process in which it generates a buff-type finish.

One of the major features of the "PG" wheel is that its rate of cut and the micro inch finish it produces remains constant from the beginning of a new wheel until it is worn down to the hub. It is not necessary to increase arbor speed to maintain cut during the life of the wheel.

Some of the major advantages of the wheel include: greatly reduced downtime on automatic equipment, since some wheels have run continuously for as long as six shifts; the space and time for operating a set-up wheel department is eliminated; the "PG" wheel is cleaner than a buffing operation since it uses oil instead of a compound; and the wheel remains sharp throughout its life because fresh mineral grain is exposed as the wheel wears.

The wheel is adaptable to hand or automatic operations, and will take the shape of the part being polished. The shape will remain constant during the life of the wheel.

"PG" wheels are available in 20 stock sizes, with diameters ranging from 14 inches to 17 inches, in 2 inches, 3 inches, 4 inches, 5 inches and, 6 inches widths. The wheels are currently being made with two types of mineral coatings—aluminum oxide and silicon carbide—in the full range of polishing grits.

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RAPID GERMANIUM RECTIFIERS

EFFICIENT • COMPACT • SEALED JUNCTIONS • LONG LIVED

The features of new Rapid GERMANIUM Rectifiers are proving to be the answer to many of the plating industry's power problems. More than any other DC power supply, Rapid GERMANIUM Rectifiers answer the need for —

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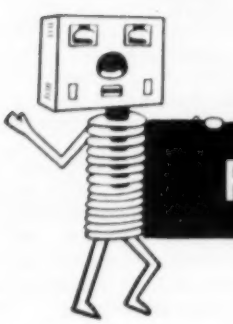
COMPACTNESS — require much less space than conventional units

SEALED JUNCTIONS — corrosion is kept out

PRECISE CONTROLS — oil immersed, fully motorized Inductrol controls, provide continuously variable control at the touch of a button

LONG-LIFE — no aging or change in characteristics even after accelerated full load tests

Find out more about RAPID GERMANIUM RECTIFIERS, "the power supplies of tomorrow — here today". Write to Rapid Electric Co., 2881 Middletown Road, New York 61, New York. Ask for Bulletin —.



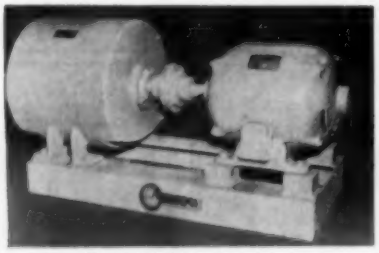
THE NAME THAT MEANS *"More Power to You!"*

RAPID ELECTRIC COMPANY

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1141.

EQUIPMENT & SUPPLIES

Tough Tumbler



Powerful Alternator Box

Brilliant Brightener

E—1151. "Mini-Tumbler—To round out its line of medium priced barrel finishers, Rampe Manufacturing Co., Cleveland, Ohio, announces its new Mini-Tumbler. As the name implies, this is a small bench tumbler with one gallon volume barrel. Despite its small size this unit is sturdily built with heavy construction and parts to stand up under continuous operation on the tumbling of small parts in laboratories, foundries, plating shops, screw machine shops, lapidary shops and industry in general. It will turn out work at the same speed and of the same quality as larger tumblers—and at a saving in production cost and factory space.

Mini-Tumbler is available with either open or closed barrel. All barrels are vinyl plastic coated. Power is furnished by a 1/12 hp split-phase, 110 volt, 60 cycle, a c motor. Net weight is 25 pounds. The machine cabinet measures 16 inches long by 9 inches wide by 7¼ inches high, showing the small amount of bench space required.

Rampe Manufacturing Co conducted a contest from their booth at the Metal Finishing Show, during the Electroplaters' Convention last June, to get a name for their new, small bench tumbling machine.

From the many names submitted "Mini-Tumbler' was selected as the most descriptive. This name was suggested by A. D. Schwegler Jr., Research Supervisor for the Cleveland Twist Drill Co., Cleveland, Ohio. The prize was a Mini-Tumbler.

E—1152. 20,000 Cycles/Sec Power Supply—The ultrasonic barrier to full scale manufacturing operations including soldering, drilling, grinding, plating, cleaning and degreasing, has been broken by the introduction of low cost high frequency rotating generators ranging in size from 2 to 150 kilowatts, recently announced by Acoustica Associates, Inc.

These alternators are capable of supplying economical power for energizing multiple arrays of above-audible sound generating transducers needed to irradiate materials and products being processed en masse, as in degassing molten metals, plating, cleaning and degreasing, or energizing groups of dip or tool soldering stations as well as drilling, cutting and grinding machines. As a consequence, the favorable results of laboratory ultrasonic experimentation can now be extended into full-scale plant production.

Ultrasonic processing invariably requires a considerable amount of high frequency power per unit of treated work. As such power had previously been generated by very expensive and complicated electronic supplies, economic considerations prevented commercially feasible employment of ultrasonic techniques despite golden promises and glowing reports from the laboratory.

Surface tension in electroplating, for example, is destroyed; hydrogen is degassed instantaneously; electrolytic action is accelerated; and the entire plating process is expedited with great savings in time, labor, machinery, and chemicals. A more uniform, non-porous plating job may be expected.

When cavitation is purposely developed, for example, to clean metal, glass, ceramic, and plastic parts which are immersed in solvent or detergent solutions, the soils, greases, chips, burrs, grit and other contaminants are literally torn away from the work by the tremendous forces associated with cold boiling. Thus the advantages of ultrasonic cleaning and degreasing systems may now be a reality for such widely diverse products as electronic components (synchros, pots, geiger tubes, etc.) watch mechanisms, precision gear assemblies, miniature bearings, optical lenses, spark plug reconditioning, and cast parts or sheet metals.

E—1153. Liquid Brightener for Cyanide Cadmium Plating—Cadmax, a new highly concentrated liquid brightener for barrel and still cyanide cadmium plating, is now being offered by Federated Metals Division, American Smelting and Refining Company, New York, N. Y. Cadmax is the first cadmium brightener to contain pure chemical compounds of known structure, eliminating breakdown products and organic impurities.

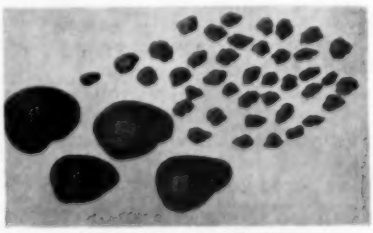
Low-foaming Cadmax will produce clear, brilliant, blue white deposits over an extremely wide range. Among other features claimed for Cadmax are: burning is prevented even with low cadmium metal content in the bath; permits the use of high throwing power baths without restricting the plating range; optimum results are produced with baths of very low nickel content, which eliminates staining problems encountered when baths with high nickel content are employed.

The new brightener is compatible with most organic brighteners currently available. Unless the bath being converted is in serious difficulty due to organic contamination, carbon treatment of the bath is not required.

The optimum concentration of Cadmax for bath maintenance is one pint (diluted with one half gallon of water) for each 20 pounds of sodium cyanide. In some instances, only ¼ to ½ pint of the Cadmax concentrate will suffice. The brightener is simple to control because the range of effective concentration is extremely wide, requiring only visual control of the work.

By using an adjuster solution furnished at no charge with the purchase of Cadmax, a new bath needs no breaking in and plates perfectly with the first load. The use of Cadmax does not require a bright dip for luster or clearness. However, a chromic acid passivating bright dip is recommended wherever staining due to inadequate rinse occurs.

E—1154. All-Purpose Tumbling Chip—One chip does it all—rough cut, fine finishing, coloring and burnishing! Not only is the new "Lorco" fused aluminum-oxide chip the fastest and hardest cutting abrasive known for precision barrel finishing, but the same chip can be transformed into an excellent medium for coloring and burnishing.

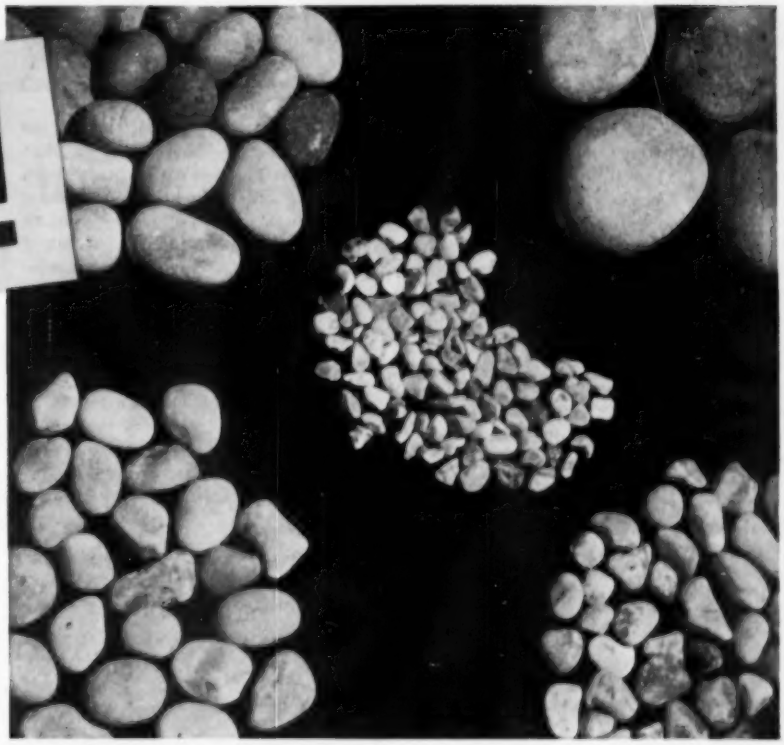


Lorco's Versatile Al_2O_3

For cutting, the fine pores of the chip must be kept from becoming glazed or loaded. Cleaned as recommended by a two-minute tumbling with Lorco compound "GW," the chip will retain its original sharpness until it wears down to fine dust. Other Lorco compounds are used to load the pores deliberately. In this condition, the chip will burnish as well as, or better than steel balls.

NEW!

TUMBLEX "N" Abrasive



PROCESSED BY NATURE and offered exclusively by Norton, the new Tumblex "N" Abrasive comes in sizes ranging from 3/16" by 3/8" to 1 5/8" by 2 1/2".

A natural for better barrel-finishing

Latest tumbling abrasive — natural flint stone — offers new "TOUCH of GOLD" benefits — brings finish up and costs down

Tumblex "N" Abrasive is Nature's own tumbling abrasive. Carefully selected and graded by Norton, it opens up new possibilities for barrel-finishing applications such as light deburring, breaking sharp edges, polishing and burnishing and other operations where little actual cut is required.

Tumblex "N" has proved particularly valuable in bringing out the most desirable color of the finished part. Metals on which it has proved its ability to give an excellent finish include zinc, brass, copper, aluminum and various forms of steel, including stainless.

Its rounded, uniform shape and very low breakdown ratio prevent wedging, permit longer cycles and reduce the need of rescreening.

Another big Tumblex "N" advantage is extremely uniform cutting action. This assures the same uniform finishing in load after load. Also, it enables close regulation of cut; for example, by adding measured quantities of loose abrasive grain to Tumblex "N" you can speed up the rate of cut with little effect on the life of this natural abrasive. Exact formulas for best results in job or production tumbling are easily worked out.

Norton customers who have tested Tumblex "N" Abrasive report:

- *"Very good luster with no noticeable wear."*
- *"Fine performance. Very little breakdown. Reordering 700 pounds of sizes 2½T and 3½T."*
- *"Color O.K. on both zinc and brass."*
- *"Very long life. Gave excellent color on stainless steel."*
- *"A good polishing stone on aluminum."*

Send Your Work Samples

Let us demonstrate in our newly enlarged Sample Processing Department how Tumblex "N" Abrasive can give the value-adding "Touch of Gold" to your product quality and cut your barrel-finishing time and costs. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. G-297

NORTON

ABRASIVES

Making better products... to make your products better

NORTON COMPANY
Abrasives • Grinding Wheels
Grinding Machines • Refractories
BEHR-MANNING DIVISION
Coated Abrasives • Sharpening Stones
Pressure-Sensitive Tapes

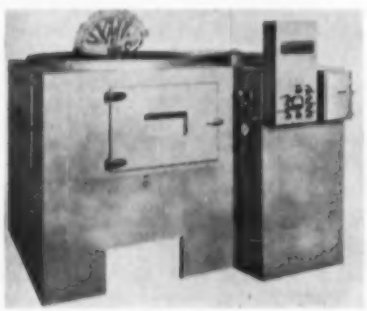
EQUIPMENT & SUPPLIES

Aluminum-oxide abrasive is produced from bauxite in a large electric furnace. The product taken from the furnace may be a beehive-shaped ingot weighing 17 tons. This is broken up by dropping a huge steel ball upon it from an electromagnetic crane (as houses are wrecked). The large chunks are reduced to manageable fragments with sledge hammers and sent to the crushers. Not all portions of the ingot are equally suitable for tumbling chips. The center is overhard; the outer rind is coarsely porous. The crude stock is selected for the new Lorco chips avoids both the too-hard center and the porous outer portions of the ingot.

Before they are screened for size, the chips are fracture tested by dropping them from a height onto a concrete platform. Only the chips that survive unbroken are permitted to be screened. By this drastic testing, every Lorco chip is assured of the proper crystalline structure to prevent fracturing of tiny particles from the chip. Such fragments can lodge in small holes of the part during tumbling and thus cause finished workpieces to be rejected.

Lorco chips are screened to range downward in sizes from 00 (2 in to 1½ in) to particles like grains of fine sand. Better and closer sizing for precision finishing has been provided by the addition of three extra half sizes: 1½ (⅞ to ¾ in), 2½ (⅝ to ½ in) and 3½ (⅜ to 0.279 in). Below 3½, the "grain sizes" follow the standard mesh sizes of the U. S. Bureau of Standards down to No. 16 and even finer.

E—1155. HNO_3 Out; Wet Blast In—A new automatic pressure blast wet blast unit for the finishing of the interiors of large cylindrical sheet metal parts has been announced by the manufacturer, the Cro-Plate Co., Inc., Hartford, Conn.

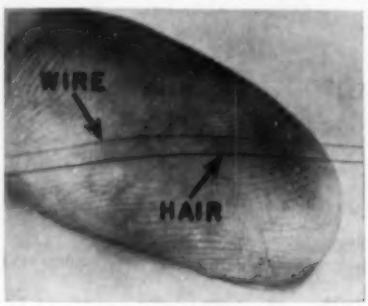


Wet Blaster

The unit was designed for a prominent Eastern rectifier manufacturer faced with the problem of removing selenium deposits from the interior areas of "half-hemispheres" approximately 30 inches in diameter. Formerly, a nitric acid dip was employed which was discarded in favor of wet blasting because of the inefficiency of the process and the inability to reclaim the selenium metal. Wet blasting completely removes all excess selenium and imparts an absolutely basis metal clean surface.

In operation, the operator lowers the part on a circular bearing around the blast gun fixture. The bearing is rotated by a variable speed drive and the gun fixture is moved back and forth by means of an air hydraulic cylinder. At the completion of the five minute cleaning cycle, work rotation and blasting automatically cease and the part is raised from the machine.

E—1156. Ultra Fine, High Precision Flat Wire—The Hamilton Watch Company's Allied Products Division announces that it is now in commercial production of extremely fine flat wire, held to extremely close tolerances of thickness, width, and uniformity of cross section.



Subcapillary Wire

As a by-product of the special process for diamond die drawing of flat wire which Hamilton developed for producing its own hairsprings, the company specializes in production of flat wire as fine as 0.0007-inch thick by 0.003-inch wide. This process produces wire with better than mirror surface finish; of uniform thickness and width; and with smooth, rounded edges. Thickness can be held to a tolerance of ±0.00001 inch and width to a tolerance of 0.001-inch. The wire is produced with extreme freedom from twist, so that spiral springs made of it lie flat, permitting easy assembly.

This precision flat wire can be produced from most of the ferrous and non-ferrous alloys except a few alloys that are difficult to cold work. And it is available from a maximum size which is 0.019-inch in overall width and 0.010-inch thick, down to the minimum size, which is 0.003-inch in overall width and 0.0007-inch thick.

Hamilton s Allied Products Division will cut the wire to precision lengths, form it in desired spring shapes, and heat treat the springs to produce desired spring operating characteristics. It will also draw the wire from metals furnished by the customer. The Allied Products Division will even manufacture this fine flat wire by any combination of rolling and drawing processes required to give the wire special physical properties specified by the customer.

Controller

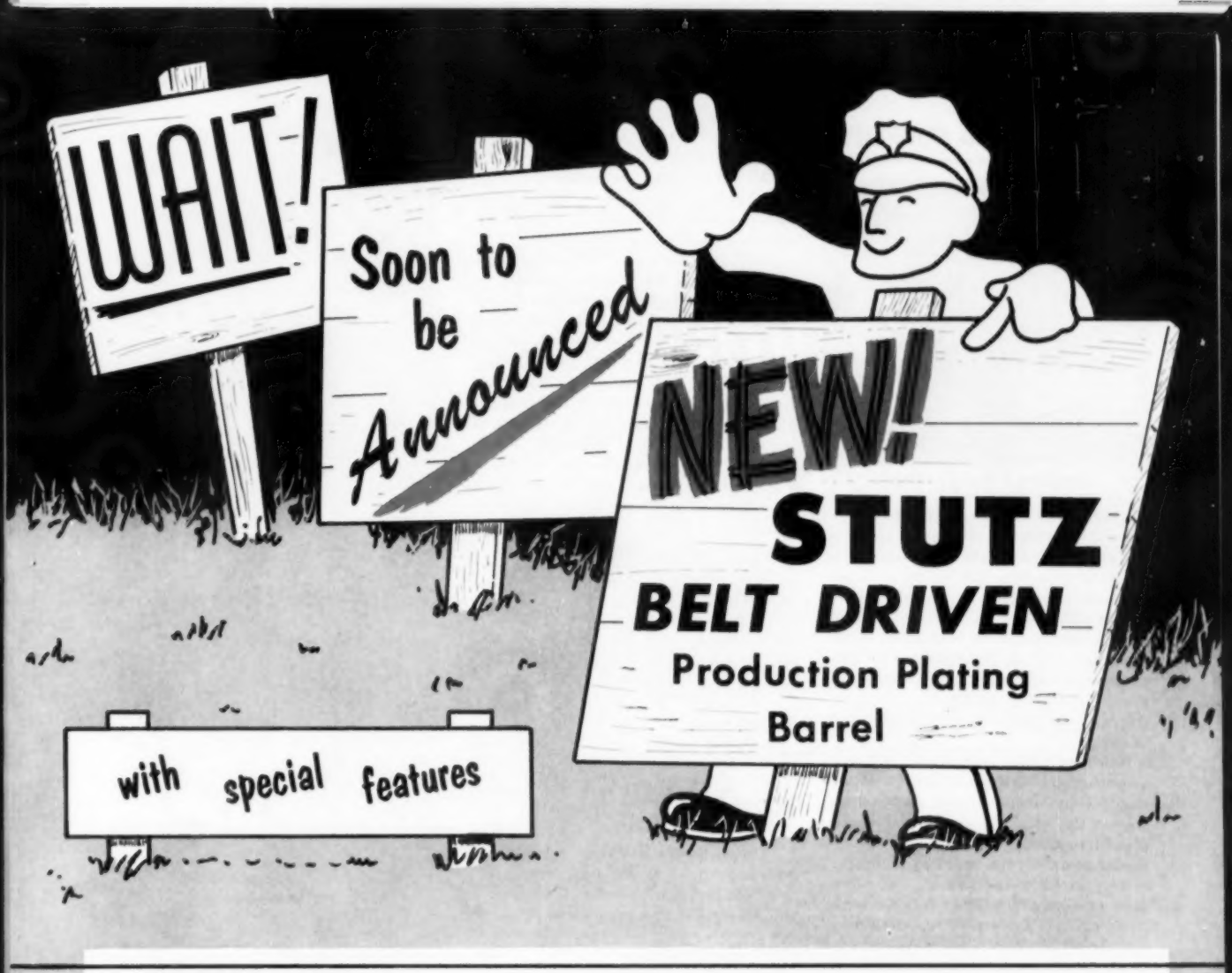
E—1157. Process Temperature Kept to 1 Per Cent of Scale On 1 Microamp.—Operating on a current of less than 1 microampere, a new temperature-indicating, electronic, contact-controller is said to automatically hold and control process temperatures as high as 2500° F to within ± 1 per cent of scale. Called the AIC Indicator/Controller, Model PB, it provides both straight cut-off and simple on-off control as required for industrial furnaces, ovens, tanks, or similar types of production equipment and machinery where temperature control is vital to product uniformity. Manufacturer is the Automation Instrument Corporation.

Easily installed, the instrument consists of two separate units housed together in a single compact case 6 in x 7 ¾ in x 5⅝ in. A pyrometer unit indicates the temperature under control up to the control point and an electronic control unit opens and closes the load relay regulating fuel supply to the controlled process. Capacity is 5 amperes at 115 volts.

A temperature setting pointer with three gold-ribbon contact fingers is moved by panel dial to the scale point where temperature control is desired. The process temperature is registered by the indicating pointer of a thermocouple-actuated millivoltmeter accurate to 2 per cent of scale. When the process temperature rises to the preset control point, the indicating pointer makes contact with the setting pointer and control action starts. Input impedance is changed; a primary relay in the plate circuit of a vacuum tube releases its armature; the load relay drops out, shutting off the process fuel supply.

When the process temperature drops below the control point, the indicating pointer moves clear of the contact fingers; input impedance rises; control action reverses turning process fuel supply back on. Control band width is 1 per cent of scale or less depending on process.

Because of circuit's high input impedance, control action is triggered by a contact resistance of 10 megaohms.



STUTZ

Portable Plating Barrels

★ The Stutz Portable Barrel is made in 2 standard sizes with cylinders having inside dimension of 6" x 12" and 8" x 18" I. D., and smaller upon application. Standard openings are 3/32". Smaller or larger openings can be furnished as required.

★ Baskets in perforated metals or wire mesh.

★ Load/Unload Stand for convenient and fast handling of work load.

MADE IN TWO STANDARD SIZES

Standard Openings	3/32"
6" x 12" I. D.	$186.50
8" x 18" I. D.	$295.00
Stand	$ 39.50
Perforated metal	$ 9.15
Wire mesh	$ 6.15

Write for Our New Catalog . . .

"Complete metal finishing equipment & supplies"

Serving Industry for 35 Years

GEO. A. STUTZ MFG. CO.

4420 Carroll Ave., Chicago 24, Ill.

EQUIPMENT & SUPPLIES

Barreling Without Binding

E—1158. For Precision Barrel Finishing—A complete line of abrasive, burnishing, cleaning, and neutralizing compounds prepared especially for precision barrel finishing operations is available from Newton Industries Inc. Four classes of compounds have been formulated specifically to meet varying requirements along progressive stages of barrel finishing operations. According to the manufacturer, they will not paste, plug, or bind up tapped or blind holes.

Newton Class A compounds for heavy deburring and cutting are used for initial stages of finishing, depending on the character of the metal, shape, size, and degree of finish required. Class B compounds for regular deburring and semi-burnishing can be used for follow-up finishing. Still other parts may require a third operation with Newton Class C compounds for burnishing. As a last stage, Class D compounds for cleaning possesses, wetting agents and disbursers which have a high detergency value and buffing action contribute to finer metal color and finish.

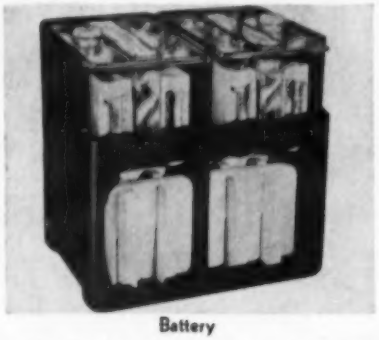
Designed for use with all media types, Newton Compounds are particularly effective with Newton Polishapes and Burnishapes media, specially cast zinc alloy forms of specific size and shape. The elongated shape of the Polishapes performs the cutting and polishing on the larger work surfaces while the pointed ends carry the abrasive or polishing compounds into the holes, recesses, and crevices. The perfectly spherical shape of Newton Burnishapes are ideal for burnishing operations.

E—1159. Protector—A clear acetate visor which gives excellent frontal and side face protection against abrasive particles, flying objects and chemical splashes, has been developed by Mine Safety Appliances Company, Pittsburgh, Pa.

Called the M-S-A Skullgard-Faceshield, it can be attached to any M-S-A protective hat without marring the hat and can be installed or removed in seconds. An aluminum pivot arm permits the shield to be swiveled up or down in any desired position. The visors are easily detached from the pivot arm for replacement.

E—1160. 1200 Amp-Hr Primary Battery—An air depolarized primary battery built for a minimum service life of one full year has been announced by National Carbon Company, a Division of Union Carbide and Carbon Corporation.

The new "Eveready" CG-212 air depolarized switch lamp battery provides the following outstanding advantages: lowest maintenance cost, lowest cost per ampere hour, unrivaled low temperature performance, greater capacity with long life, uniform voltage over entire life span, and standard AAR terminals. It was designed and developed by signal battery experts to answer requests for a disposable switch lamp lighting primary battery having a "one year changeout" plus ample safety cushion to permit flexibility in change out schedules.



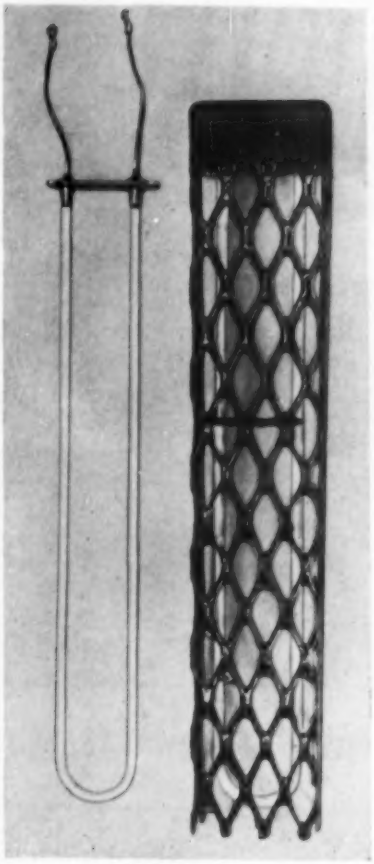
Battery

Because the carbon-to-air contact has been so greatly improved and enlarged for more efficient depolarization the CG-212 will deliver its rated capacity at continuous drains up to 0.300 amperes at a solution temperature of 70°F. One "Eveready" CG-212 battery will operate several switch lamps simultaneously as the voltage curve remains nearly flat throughout the battery's long useful life.

E—1161. Portable Multiple Outlet—Goodwill Manufacturing Company introduces its new portable Safety "Power Panel" especially designed for excessive loads on a power line without blowing fuses. The express purpose of a Safety

Big Loads Without Blows

"Power Panel" is to facilitate the use of appliances, motors, drills and auxilliary lighting through a multiple outlet circuit breaker. Circuits are protected by a 6 ampere fuse for small power tools and a 10 ampere Time Delay fuse for maximum ¾ hp ac motor operation. All component parts are "UL" approved.



HCl Absorbers

E—1162. HCl Absorbers—Pictured are two Camac Karbate falling film HCl absorbers designed for laboratory and pilot plant applications. Units are available in capacities of 15, 30 and 45 lb/hr of HCl gas. Matching scrubbing towers and piping connections are available if required.

Heads are made of Furacam plastic, falling film cooling tube is of Karbate and cooling water jacket is steel. A special packing arrangement is employed to allow easy tube replacement and cleaning. Design provides for delivery of cool stable acid up to 22° BE. concentration.

E—1163. Quick-Cut Compound—Where fast deburring and stock removal are to be accomplished in a short time, Lorco "QC" (quick cut) will do the job. This fine-grain abrasive compound for precision barrel finishing will cut as much as any other abrasive-type compound during the first two to five hours but should not be used where runs longer than six hours are necessary.

Lorco "QC" produces a smooth finish and good color. It is used with abrasive chips, generally at low water level, and is also ideally suited to the self tumbling of small parts.

ALWAYS FINISHES FIRST

—and lets buffs live up to 400% longer

fast cutting, easy cleaning with

Liquimatic®

the perfect liquid compound for all metal finishing

It's a fact—Liquimatic's continual lubrication lengthens buff life up to 400%. It's not hard to figure that such a healthy saving on buffs soon pays for a complete Liquimatic Application System—a system that *continues* to save you money in all phases of your buffing and polishing operations.

Liquimatic saves on production costs because it's completely automatic. An electrically timed system feeds Liquimatic Compound to the buff in exactly the right amount to produce the exact rate of cut you need. There's no compound wasted, no nubbin problem. No hand application, no changing bars, either—can you see any savings here in your buffing room?

Check the other features of Liquimatic Liquid Buffing Compound... then write today for your free copy of Liquimatic's folder that tells the whole cost-saving story of Liquimatic in *your* buffing room.

Liquimatic ...

gives more buff mileage

These additional Liquimatic features mean real savings in terms of time, money, safety—

• completely automatic • fast cutting • lower compound cost • easy cleaning • adhesive slow-wearing buff face • non-settling • high flash point • long storage life • sprayable viscosity

1433

PLATEMANSHIP

Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

HANSON-VAN WINKLE-MUNNING COMPANY

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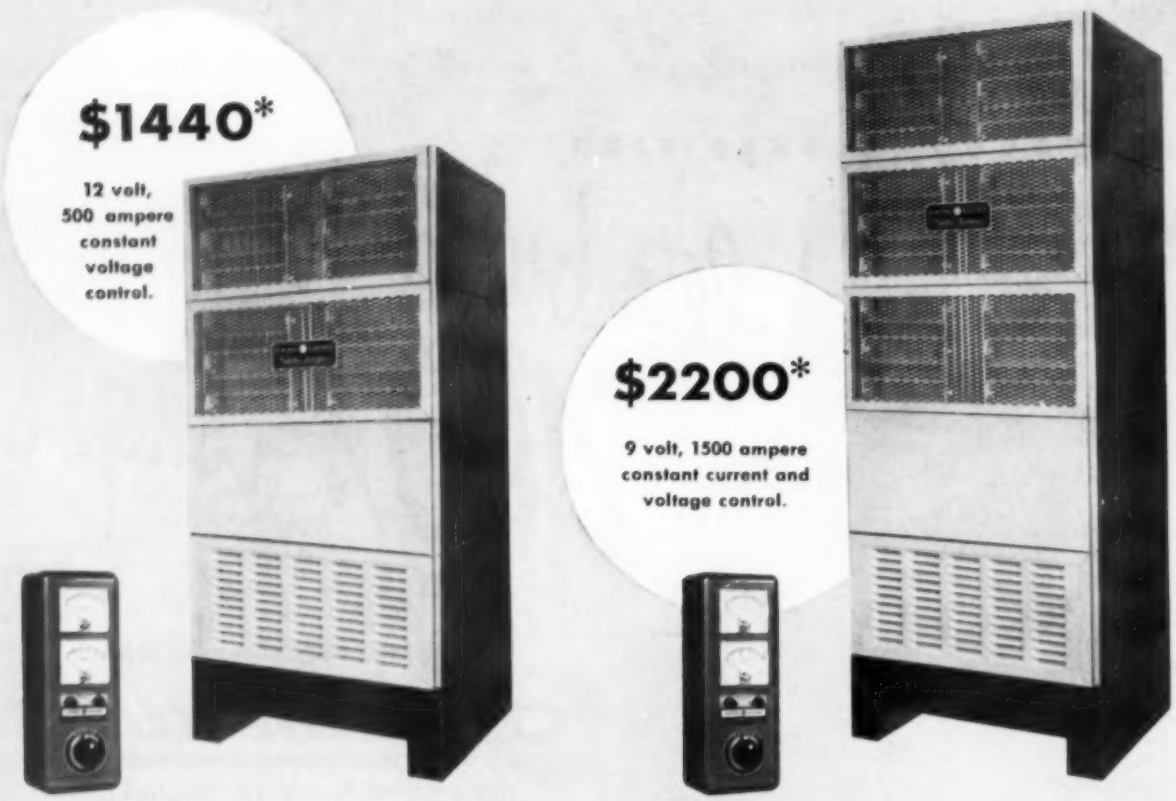
H-VW-M

INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES



NOW Low Prices on G-E Automatic Make "Automatic Savings" Available to

TRIM ALLOYS, INC., OF BOSTON SHOWS HOW G-E AUTOMATIC POWER SUPPLIES SAVE LABOR, SPOILAGE, AND MAINTENANCE.

Lower prices on General Electric automatic plating rectifiers now let you take a big step toward complete automation . . . at low cost.

Besides bringing within your reach the savings of automation, G-E automatic plating power supplies are designed to assure you of uniform plating.

The Trim Alloys, Inc., installation was engineered by The Chemical Corp., Springfield, Mass.

HERE IS THE REPORT OF TRIM ALLOYS, INC., which uses G-E automatic plating power supplies for anodizing aluminum extrusions: "Ours is a high quality process, yet we don't want to waste time, manpower, or materials. In order to maintain our high standards with manual control, we would need a man on the controls all the time. With G-E automatic control, however, we free our operators for other work . . . and get much better control, too. We simply push the start button and the unit seeks its own best setting for that particular load, shutting itself off at precisely the same interval each cycle."

Progress Is Our Most Important Product

GENERAL ELECTRIC

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1145.

COMPARE THE PRICES OF THESE LARGER UNITS

24-volt, 4000-ampere unit with automatic anodizing control — **$8860***

9-volt, 10,000-ampere unit with automatic voltage control — **$10,080***

24-volt, 3000-ampere unit with automatic anodizing control and sealed, oil-cooled stacks — **$8380***

* *Manufacturer's suggested user price.*

Plating Rectifiers Every Plating Shop

AN INCREASING NUMBER OF PLATING SHOPS are discovering that G-E plating power supplies with automatic control cut plating costs in three big areas:

1) LABOR—No one needs to stand by the controls to adjust for changes in the tank load. Plating operators can be freed for other operations.

2) SPOILAGE—Spoilage is reduced, since deposition is kept uniform by the constant current or voltage. This reduction in spoilage means fewer rejects . . . less re-working expense.

3) MAINTENANCE—Maintenance is kept low, because both the G-E automatic control and rectifier are mechanically static. Except for the cooling fan, there are no moving parts.

BEFORE YOU BUY ANY PLATING RECTIFIER, check G.E. for the three types of automatic regulation available: (1) voltage, (2) current, and (3) anodizing.

For full details, contact your G-E plating agent, or send in the coupon.

UNIFORMLY ANODIZED EXTRUSIONS are removed from the tank at Trim Alloys, Inc. Automatic control, assures uniform, high-quality anodizing every time, resulting in fewer rejects.

THE DESIRED ANODIZING SEQUENCE is set up by the operator at the rectifier control panel. Once set, the anodizing sequence is completely automatic, requiring no further adjustment.

THE REMOTE-CONTROL STATION is conveniently located within easy reach of the operator right at the anodizing tank.

Section B463-13, General Electric Co., Schenectady 5, N. Y.

I would like to receive additional information on how I can save money when I plate with G-E automatic plating power supplies. Please send me bulletin GEC-970A.

NAME .....

COMPANY .....

ADDRESS .....

CITY & STATE .....

NEW... from Wyandotte

Expray-AP

An all-purpose, rust-inhibiting metal cleaner for spray washers

Here's a new alkaline spray cleaner that fills a definite need in metal cleaning. Not just an improved version of cleaners already on the market, Wyandotte's EXPRAY-AP is unique . . . research-developed, proved in use. Here are some typical spray-cleaning applications:

Steel parts — EXPRAY-AP is excellent for removing fabricating soils and preventing rust — even cold in a one-stage washer.

Zinc die castings — EXPRAY-AP is nonetching and provides protection against staining.

Cast-iron parts — EXPRAY-AP removes chips and dust, prevents rust on machined surfaces.

Glass — EXPRAY-AP eliminates streaking, removes pitch, rouge, and oils from lenses and other glass products.

If you're looking for ways to improve your metal-cleaning or finishing operations, call in your Wyandotte representative. Let him show you what EXPRAY-AP can do in *your* plant. Or clip and mail coupon today! *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, Calif. Offices in principal cities.*

EXPRAY-AP gives you all these benefits — *and more!*

Powerful cleaning action — contains free-rinsing synthetic detergents!

Easy to use — noncaustic, nondusty, free-flowing!

Low-foaming — even at high concentrations and in high-pressure washers!

Prevents scale — even in hardest water!

Prevents rust — contains its own rust inhibitor!

Economical — lower use-cost and reduced equipment maintenance!

Wyandotte
CHEMICALS
J. B. FORD DIVISION

WYANDOTTE CHEMICALS CORPORATION
Wyandotte, Michigan

Please send me further information and technical data on EXPRAY-AP.

Name_____

Company_____

Address_____

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THE EFFECT OF DIFFERENT CHROMIUM DEPOSITS ON THE FATIGUE STRENGTH OF* HARDENED STEEL*

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The fatigue properties of hardened SAE 4140 steel have been investigated when plated with different types of chromium. The effect of chromium plating on fatigue strength of steel is found to be related to stress in the deposit. The crack pattern, characteristic of electrodeposited chromium, is related to stress and thus indirectly to fatigue in unbaked deposits.

Neither hydrogen embrittlement of the base metal nor hairline cracks formed during electrodeposition, which might act as notches, can account for the experimental results.

Fundamental knowledge gained about the mechanism of fatigue in chromium plated steel led to the development of baths and plating conditions which give deposits with greatly improved fatigue properties.

INTRODUCTION

Since some fatigue failure has been encountered with chromium plated, high strength steels, this study was made to determine the effect of different types of chromium deposits on the fatigue strength of hardened SAE 4140 steel. The study was focused on the chromium deposit with the view of obtaining information about the particular properties of electrodeposited chromium which are detrimental to the endurance strength of steel under repeated loading. If the basic factors important in fatigue could be established and controlled, then improved deposits could be developed for practical engineering applications. The attainment of both objectives are reported in this paper.

Previous investigators[1–7] have shown that high strength steels suffer a greater loss in fatigue strength after chromium plating than weaker steels. Also, some chromium deposits are more damaging to fatigue properties than others. The lowering of the fatigue strength after chromium plating has been attributed by the various authors to one or more of the following causes:

(a) Hydrogen embrittlement imparted to steel during the plating process.

(b) A notch effect, due to hairline cracks formed during electrodeposition of chromium.

(c) High tensile stress usually present in chromium deposits.

Much of the data reported in this paper sheds light on the mechanism of fatigue loss in high strength steel after chromium plating. Results show that (c) is the primary factor.

EXPERIMENTAL SECTION

TEST MATERIAL

The steel used for the preparation of fatigue test specimens was SAE 4140. Two different lots of steel having the following composition of analyses were used:

Lot	*C*	*Mn*	*P*	*S*	*Si*	*Cr*	*Mo*
No. 1	0.40%	0.89%	0.009%	0.014%	0.26%	0.93%	0.2%
No. 2	0.41%	0.94%	0.012%	0.024%	0.27%	1.02%	0.10%

Specimens from lot No. 1 were used first; and, when additional specimens were required, the second lot was obtained. In both cases, the steel was stress relieved, heated to 1550° F, oil quenched and drawn at 800° F. The tensile strength was 211,000 psi for lot No. 1 and 222,500 psi for lot No. 2. The hardness was Rockwell C43 and the fatigue limit was 109,000 psi for both lots. Since both lots have the same fatigue limit, the results after chromium plating can be compared to show the effects of particular deposits.

Fatigue test specimens were machined to the dimensions of the standard test specimen for the R. R. Moore rotating beam, fatigue-testing machine, with a reduced diameter of 0.250 inch. The specimens were ground circumferentially and then polished longitudinally in the test area to a two or three micro-inch finish.

ELECTROPLATING OF FATIGUE SPECIMENS

Prior to plating, the tapered ends of the specimens were stopped off with a nonconductive tape, leaving exposed for plating the polished test area of approximately two square inches.

Each set was plated in series to insure that each specimen would receive the same current. Each specimen was located in the center of a plating cell surrounded by a lead anode in the form of an open-end cylinder, three inches in diameter. Periodic additions were made to the baths from time to time to replace solution lost by evaporation and spray. The temperature was maintained by a constant-temperature water bath in which the plating cells were placed.

Prior to chromium plating, the fatigue test specimens were degreased by wiping with carbon tetrachloride, water rinsed,

*Presented at the 42nd Annual AES Convention, Cleveland, Ohio. The discussion following the presentation is not included here, but will be found in the "Annual Proceedings of the AES, 1955."

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and then given a reverse current etch for one minute in the test bath solution at the same current density used for plating. Then, they were plated at the specified current density for the required length of time.

A nominal chromium thickness of 0.010 inch was chosen as a standard. Unless otherwise specifically stated, this was the thickness used.

TESTING FOR THE FATIGUE LIMIT

The fatigue tests were made using the R. R. Moore, rotating beam, fatigue test machine with an operating speed of 10,000 rpm. The specimens were fitted snugly in the machine and the proper load applied to provide a desired stress. The fatigue limit was calculated on the basis of the unplated diameter, which is the common method in reporting fatigue data for plated specimens.

The fatigue limit was arbitrarily chosen to be the stress halfway between the highest stress at which a specimen ran ten million cycles without fracture and the lowest stress at which another specimen in the same set fractures during testing.

In order to save time and reduce the number of fatigue test specimens required to evaluate a deposit, an approximation method was developed using 3 specimens rather than the 9 to 18 required for complete S-N curves. Such a method is feasible because chromium plated hardened steel invariably breaks before one million cycles, if the load is above the fatigue limit. The method consists of testing the first specimen in the set for one million cycles at some load below the fatigue limit. If the specimen does not break, the load is increased 10,000 psi and run for another million cycles. The stress is successively increased in this manner until the specimen fractures. Then, the second specimen is tested at a stress 10,000 psi below the load at which the first specimen fractured and run until failure occurred or to a full 10 million cycles. The third specimen is then run at a load 10,000 psi lower if the second specimen failed or 5,000 psi higher if the second specimen went 10 million cycles. By the proper sequence of loads, an approximate fatigue limit within ±5,000 psi was obtained with only three test specimens. A more exact determination was made on all deposits which promised to be of importance in giving improved fatigue properties.

COUNTING CRACK LINES IN CHROMIUM DEPOSITS

Early tests showed that the fatigue increases as the number of hairline cracks in the deposit increases. These crack lines are normally found in electrodeposited chromium. They form during plating and are filled-in by further deposition. In order to put this observation on a semiquantitative basis, the surface of the deposit was examined, and the average number of crack lines which crossed an arbitrary straight line one inch long were counted. Examination was made with the unaided eye and with magnifications up to 750. The number of crack lines observed for a number of different chromium deposits is listed in Table I.

Deposit Number	Bath	CrO_3 g/l	SO_4 g/l	Plating Temp °F	Plating CD asi	Cracks per Inch Unbaked	Deposit Baked °F, 2 hr	Stress, 1000 psi 0.002 Inch Cr Spiral	Stress, 1000 psi 0.002 Inch Cr Flat Strip	Fatigue Limit 0.010 Inch Cr 1000 psi
0	No plate	—	—	—	—	—	—	—	—	109
1a	CR-110*	180	—	110	1	3500	none	−17	—	97.5
1b	CR-110*	180	—	110	1	—	350	—	—	17.0
1c	CR-110*	180	—	110	1	—	750	—	—	37.5
2	CR-110*	225	—	150	2	2900	none	—	—	90.5
3a	CR-110*	225	—	130	2	1300	none	−3	−8	73.5
3b	CR-110*	225	—	130	2	—	350	—	12	30.0
3c	CR-110*	225	—	130	2	—	750	—	—	45.0
4	Standard Sulfate	250	2.5	110	1	1200	none	3	—	—
5	CR-110*	225	—	150	6	1000	none	—	—	72.5
6a	Standard Sulfate	250	2.5	130	2	400	none	40	8	57.4
6b	Standard Sulfate	250	2.5	130	2	—	350	—	16	38.7
6c	Standard Sulfate	250	2.5	130	2	—	750	—	—	53.8
7	Standard Sulfate	250	2.5	150	2.9	50	none	47	—	—
8a	CR-110*	315	—	140	3	22	none	60	27	30.0
8b	CR-110*	315	—	140	3	—	350	—	19	23.7
8c	CR-110*	315	—	140	3	—	750	—	—	47.5
9a	Low Contractile	250	2.5	185	5	few	none	—	—	27.5
9b	Low Contractile	250	2.5	185	5	—	350	—	—	14.0
9c	Low Contractile	250	2.5	185	5	—	750	—	—	37.5
10a	CR-100*	300	—	86	3	44	none	—	—	16.7
10b	CR-100*	300	—	86	3	—	350	—	—	14.5
10c	CR-100*	300	—	86	3	—	750	—	—	25.0
11a	U. S. 2,462,615	600	2.9	85	3	—	none	—	28	27.5
11b	U. S. 2,462,615	600	2.9	85	3	—	500	—	6	77.5
11c	U. S. 2,462,615	600	2.9	85	3	—	750	—	—	75.0
12a	High Conc.**	600	4.8	130	3	—	none	—	—	25.0
12b	High Conc.**	600	4.8	130	3	—	375	—	5	90.0
12c	High Conc.**	600	4.8	130	3	—	550	—	1	104
12d	High Conc.**	600	4.8	130	3	—	450	(on steel with 266,000 psi) T.S.		101

*Proprietary Bath, United Chromium, Inc. **Patent Pending.

STRESS IN CHROMIUM DEPOSITS

The relationship between crack lines and fatigue suggests stress as an important factor in fatigue. Thus, a study of stresses in electrodeposited chromium was made.[10] Both the "spiral contractometer"[11] and the "rigid flat strip"[12] methods of stress measurement were used. The "spiral contractometer" method can be used only with unbaked deposits while the "rigid flat strip" method is applicable to baked deposits as well. With unbaked deposits somewhat different stress values were obtained by the two methods. This was attributed to the difference in the measuring methods, since bending is allowed during plating in the case of the "spiral contractometer" while in the "rigid flat strip" method the test strip is held rigid during plating, but allowed to bend afterward. These results are explained more fully in the paper on stress.[10] Stress data pertinent to this discussion are reported in Table I for the different deposits.

RESULTS AND DISCUSSION

FATIGUE STRENGTH OF UNBAKED CHROMIUM PLATED STEEL

A number of deposits from different baths and with different plating conditions were tested for fatigue, stress and number of crack lines. The results are given in Table I. Deposit 6 from the ordinary chromium plating bath at common commercial plating conditions, gave a fatigue limit of 57,400 psi. This result represents a loss of 48 per cent compared to the value of 109,000 psi for the unplated steel.

Deposit 3 from the CR-110* bath at 130° F gave a fatigue limit of 73,500 psi—a loss of only 33 per cent. This deposit contains more hairline cracks than the standard sulfate bath and provided the clue for the correlation of fatigue properties in unbaked chromium with the crack pattern, since the condition of plating to provide more or less numerous cracks in the deposit is known. By making use of this knowledge, deposits were obtained which possessed as many as 3,500 cracks per inch and which gave the very high fatigue limit of 97,500 psi (deposit 1), as well as deposits possessing very few or no cracks, which gave the very low fatigue limit of 16,700 psi (deposit 1c). Figure 1 shows a plot of the data in Table I for unbaked chromium deposits with the fatigue strength vs the number of cracks in the deposit. The fatigue limit increases as the number of crack lines increase. The type of solution, or the conditions of plating, effected the fatigue strength only as they also changed the crack pattern in the deposit.

A simple expression relating the fatigue strength with the number of crack lines in Figure 1 is as follows:

a) $F_p = F_s + 1.3\ \sqrt{C} - 85$

Where:

F_p = Fatigue limit of plated steel in 1000 psi
F_s = Fatigue limit of unplated steel in 1000 psi (109,000 psi for the steel used)
C = Number of crack lines per inch

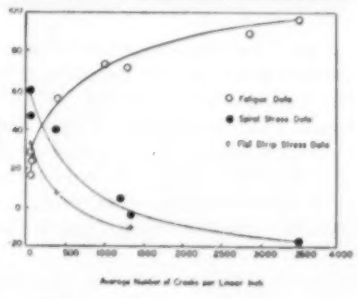

Figure 1. Correlation of Crack Lines, Stress and Fatigue in Unbaked Chromium

*United Chromium, Incorporated.

By rounding off and substituting 110 for F_s the equation simplifies to:

b) $F_p = 1.3\ \sqrt{C} + 25$

The equations provide a simple method of approximating the fatigue limit for unbaked chromium deposits from the crack pattern obtained.

The number of crack lines in a deposit may be taken as a qualitative measure of the stress in electrodeposited chromium. The more numerous the crack lines the less stress found in the deposit. Thus, the crack lines indicate stress relief and as explained previously,[10] also account for compressive stress in deposits possessing very numerous crack lines. Stress is plotted against crack density in Figure 1 for both "spiral contractometer" stress data, and "rigid flat strip" stress data. In both cases, the number of crack lines increase as the stress decreases. The two curves for stress vs crack density representing the two sources of stress data are parallel to each other and inverse to the fatigue vs crack density curve.

These stress vs crack density curves can also be described by a simple relationship as follows:

c) $S = K_1 - 1.3\ \sqrt{C}$

Where:

S = Stress in 1000 psi
K_1 = Some constant (55 for spiral stress data)
(40 for flat strip stress data)

The same data may be used to plot stress vs fatigue as is shown in Figure 2. Here a straight line relationship is obtained, as is indicated by combining equations a and c above. The fatigue limit is shown to decrease in a linear fashion as the stress increases. This can be expressed simply as follows:

d) $F_p = K_2 - S$ or

e) $F_p = F_s - (S + K_3)$

Where:

F_p, F_s and S are the same as before and:
K_2 = Some constant (80 for spiral stress data)
(65 for flat strip stress data)
K_3 = Some constant (30 for spiral stress data)
(45 for flat strip stress data)

The curves obtained with the spiral contractometer and with the rigid flat strip are both straight lines and parallel to each other. Thus, the same equations apply for both methods of stress measurement but with a different constant. The difference in K is due to the difference in the stress build up in the case of the spiral contractometer which is allowed to bend during plating and the flat strip which is held rigid. Another factor effecting the constant is the fact that spiral contractometer measurements were made at the plating temperature, while the flat strip measurements were at room temperature, thus introducing a coefficient of thermal expansion effect.

By utilizing the principles outlined above, baths and plating conditions were selected which gave deposits possessing 3,500 crack lines per inch and a stress of −17,000 psi at 0.002 inch thickness. This chromium (deposit 1) gave a fatigue limit of 97,500 psi at 0.010 inch thickness on the high strength steel used in this study. The value of 97,500 psi is compared to 57,400 psi for deposits from the standard sulfate bath (deposit 6, Table I), a comparative improvement of 70 per cent.

FATIGUE STRENGTH OF CHROMIUM PLATED STEEL AFTER BAKING

For many applications chromium plated steel parts are baked after electrodeposition in an effort to reduce hydrogen

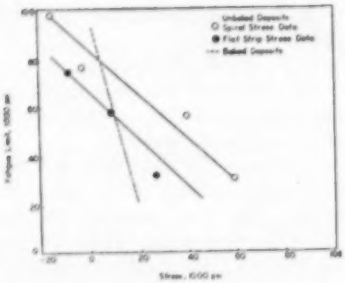

Figure 2.
Stress versus Fatigue, Unbaked Chromium

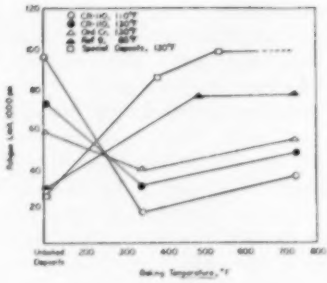

Figure 4.
Effect of Baking on Fatigue, Several types of Chromium

embrittlement in the base metal. A customary treatment is to bake at 300 to 400° F for 1 or 2 hours. Although such a baking treatment reduces embrittlement, it severely lowers the fatigue strength of chromium plated steel. However, Logan,[1] Wellinger and Keil[13]and Cabble[14] have shown that baking at temperatures above 750° F are less objectionable.

In order to determine the effect of baking on the fatigue properties of plated steel, a number of different types of deposits were baked at 350° F and 750° F. The 750° F temperature was the upper limit for the baking temperature since the draw temperature for the hardened SAE 4140 steel was 800° F and softening would result at higher temperatures. Deposit 6, from the standard sulfate bath, possessing an intermediate number of cracks, showed the customary lowering of fatigue strength on baking at 350° F and a partial restoration after baking at 750° F. With the high strength steel used in this study, the restoration in fatigue strength after baking at higher temperatures was not nearly as great as that reported for weaker steels.[1, 13, 14]

Baking deposits possessing numerous cracks (deposit 1), lowered the fatigue limit to a value lower than that for deposits possessing an intermediate number of cracks. In this case, the high temperature bake at 750° F improved the fatigue limit to 37,500 psi.

Baking deposits possessing only a few crack lines per inch (deposits 8, 9 and 10) produced relatively small changes in the fatigue strength. The values are quite low both before and after baking.

Deposits 11 and 12, which also possess few countable crack lines, appear to be of a different type. These deposits give poor fatigue unbaked, but show greatly improved results after baking. Deposits 8, 9 and 10 appear to stress relieve much less on baking and thus retain their high stress. They belong to what has been termed "low contractile" chromium. On the other hand, deposits 11 and 12 show high stress and low fatigue strength before baking. On baking, however, the stress decreases sharply while the fatigue strength increases correspondingly.

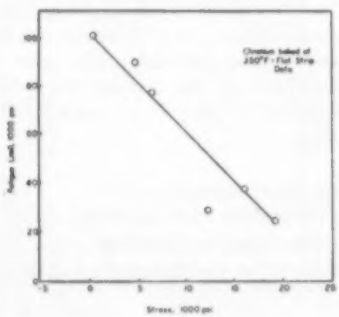

Figure 3.
Stress versus Fatigue, Baked Chromium

The stress and fatigue values given in Table I after baking are plotted in Figure 3. The data follow a straight line within experimental error and can be described as follows:

f) $F_p = F_s - (4S + K_4)$

g) $F_p = 95 - 4S$

Where:

F_p, F_s and S have the same meaning as before and $K_4 = 15$.

The slope is 1 for unbaked deposits as shown in Figure 2 and changes to 4 for baked deposits as shown in Figure 3. This may be due to differences in the physical properties of the chromium-steel interface before and after baking or to physical changes in the chromium deposit itself.

FATIGUE WITH SEVERAL TYPES OF CHROMIUM, BAKED AND UNBAKED

The fatigue data in Table I may be plotted with fatigue vs baking temperature as shown in Figure 4. The data are plotted for deposits 1, 3, 6, 11 and 12. These five deposits form a family of curves which illustrate the effect of baking on the fatigue strength of chromium plated steel. At one extreme, high fatigue strength is obtained before baking but low fatigue strength after baking. At the other extreme, another deposit shows low fatigue strength before baking but quite high fatigue strength after baking. Other deposits show regular gradations in between. This family of curves may be further discussed by considering the fatigue strength before and after baking for three of the different types of deposits.

Case A———

Case A represents the 180 g/l CR-110 deposit plated at 110° F and possessing 3,500 lines per inch (deposit 1). The stress is negative (compressive) and a high fatigue limit of 97,500 psi is obtained before baking. After baking at 350° F, the deposit shrinks due to loss of hydrogen, the stress increases, and the fatigue limit drops drastically. After baking at 750° F, the stress has become high enough to obtain some stress relief by cracking and the fatigue strength increases somewhat.

Case B———

Case B represents the situation in which the stress is intermediate as for example the ordinary chromium deposit with 400 cracks per inch (deposit 6). Here, the intermediate stress results in an intermediate fatigue strength which again decreases on baking due to shrinkage of the deposit with its corresponding increase in stress. Since baking at 750° F gives somewhat more stress relief in this case, the fatigue limit increases a little more than in Case A.

Case C———

Case C represents the type of chromium which before bak-

TABLE II

Deposit Number	Bath	Plating Conditions	Chromium Thickness 0.001 Inch	Fatigue Limit, 1000 psi		
				Unbaked	Baked 350° F 2 hrs	Baked 750° F 2 hrs
3	CR-110, 225 g/l	130° F, 2 asi	0.06	72.5	72.5	97.5
			0.12	72.5	77.5	87.5
			0.3	75.0	72.5	92.5
			10.0	73.5	30.0	35.0
2	CR-110, 225 g/l	150° F, 2 asi	1.0	87.5	62.5	80.0
			2.0	77.5	47.5	...
			5.0	82.5	37.5	75.0
			10.0	90.0	...	...
12	600 g/l, 4.8 SO_4	130° F, 3 asi				(550° F)
			1.0	...	85.0	95.0
			5.0	...	85.0	97.5
			10.0	25.0	90.0 (375° F)	104

ing possesses few crack lines, has a high "as plated" stress, and exhibits low fatigue strength (deposit 12). On baking at 350° F, the deposit shrinks due to loss of hydrogen, stress relief is encountered even at this relatively low baking temperature, and as a result the fatigue limit increases. Higher baking temperatures stress relieve the chromium even more and fatigue strength increases correspondingly. This example differs from deposits which possess high initial stress, i.e., 8, 9 or 10, but which do not shrink on baking. In this latter case the stress is not appreciably relieved by baking.

THE EFFECT OF CHROMIUM THICKNESS ON THE FATIGUE PROPERTIES

The standard chromium thickness for fatigue testing in this study was 0.010 inch as shown in Table I. However, the effect of thickness was checked both before and after baking as shown in Table II. Surprisingly, the fatigue results for unbaked specimens were largely independent of thickness. Deposit 3, with a thin plate of 0.00006, 0.00012 and 0.0003 inch, representing 3, 6 and 15 minutes of plating time respectively, gave practically the same fatigue limit as the deposit 0.010 inch thick. This is a very striking illustration of the importance of the first few minutes of plating upon the final fatigue limit. Deposit 2 with thicknesses of 0.001, 0.002, 0.005 and 0.010 inch also shows a similar trend.

The absence of a definite trend of decreasing fatigue strength with increasing thickness is connected with the shape of the stress vs thickness curve for deposit 3 which is shown in Figure 5. These stress data[10] show that the stress is highest when the deposit is very thin and decreases rapidly with increasing thickness, even becoming negative at greater thicknesses. Other work in the same paper[10] shows that the instantaneous stress in the deposit becomes negative in the first few minutes of plating for this deposit. Thus, the chromium plated in the first few minutes possesses high tensile stress and it is this chromium which is doing the most to effect the fatigue limit. Increased thickness of negatively stressed chromium does not further change the fatigue limit. Other deposits with different stress vs thickness characteristics would not show the same fatigue vs thickness relationship.

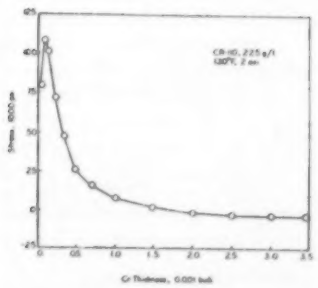

Figure 5. Stress versus Chromium Thickness, Unbaked Chromium

After baking, however, these same deposits show a marked decrease in fatigue properties with increasing thickness. On the other hand, deposit 12 (Table II) which is characterized by high fatigue and low stress after baking shows very little change in fatigue with thickness. This again shows that the stress is quite low and that the primary effect is near the chromium steel interface.

FATIGUE TESTS AFTER BAKING: EXTRA HIGH STRENGTH STEEL

The chromium plate described as deposit 12 in Tables I and II gave such marked improvement after baking when plated on the SAE 4140 steel hardened to give a tensile strength of 222,500 psi that further tests were made with even harder steel. For these tests, SAE 4140 steel was hardened as before but annealed at 500° F. This gave a steel with a tensile strength of 266,300 psi. Fatigue test specimens were plated as before and baked at 450° F for 4 hours. Both the plated and unplated specimens were tested at Wright Air Development Center. The unplated steel gave a fatigue limit of 103,000 psi while the plated and baked specimens gave a fatigue limit of 101,000 psi, a reduction of less than 2 per cent.

FATIGUE PROPERTIES OF OTHER ELECTRODEPOSITED METALS

Fatigue data for electrodeposited metals, such as nickel and copper, plated on high strength steel is not available in the literature. Hence, these metals were tested on the hardened SAE 4140 steel with a tensile strength of 211,000 psi. This was done to give a comparison with the improved chromium deposits. Deposits from the dull, Watt's type nickel, bright

TABLE III

Deposit	Plate Thickness 0.001 Inch	Fatigue Limit 1000 psi
Unplated Steel	0	109
Watts Nickel	1	45.0
Bright Nickel	1	85.0
Copper	1	87.5
Lead	1	105

nickel with an organic brightener, copper from the pyrophosphate type bath and lead plate were tested at 0.001 inch thickness. The fatigue results are given in Table III.

It is interesting to note that Watt's type nickel gave a fatigue limit of only 45,000 psi while the bright nickel with organic brightener gave a much better value of 85,000 psi. The bright nickel was shown to possess a compressive stress of —3,000 psi. Thus the data agrees with Almen's[8] findings with softer steel that compressively stressed bright nickel gives better fatigue properties than the Watt's nickel with tensile stress. The copper deposited from the pyrophosphate bath gave a fatigue limit of 87,500 psi while lead gave a value of 105,000 psi. It is interesting that none of the deposits, except lead, give higher fatigue limits than the improved chromium deposits discussed earlier.

THE MECHANISM OF FATIGUE STRENGTH LOWERING OF CHROMIUM PLATED STEEL

This investigation introduces new data useful in tracing the mechanism of the lowering of the fatigue strength of chromium plated steel, especially when considered in conjunction with previous information. The close correlation between stress and fatigue clearly demonstrates that stress is the primary factor in determining fatigue properties. Thus, deposits with high stress give low fatigue results while deposits with low stress give high fatigue results.

The possibility that hairline cracks, formed and filled-in during plating, act as notches and lower the fatigue limit is discounted, since increasing the number of crack lines by changing the bath and plating conditions actually increases the fatigue limit rather than lowering it (Figure 1). Similarly, hydrogen embrittlement of the base metal during plating does not account for the fatigue strength lowering since baking at 350° F is known to greatly relieve embrittlement while decreasing the fatigue strength for many of the chromium deposits. The experimental observations, however, show that stress in the deposit is the primary determining factor.

The relationship between stress in a chromium deposit and the fatigue strength of chromium plated steel led in this discussion to the development of several equations which describe the fatigue behavior in relation to stress in the deposit. In order to see if this stress information could be made to apply to steels with different tensile strengths, data were collected from the literature and tabulated in Table IV. All deposits are at least 0.008 inch thick and are plated on SAE 4130, 4140 or 4340 steels hardened to give different tensile strengths. The data are plotted in Figure 6 as fatigue limit vs tensile strength curves.

The section A of Table IV gives the fatigue limit for commercial chromium deposits after baking at approximately 400° F as obtained by a number of different investigators with steel ranging in tensile strength from 86,000 psi up to 211,000 psi. The fatigue strength of the plated and baked test pieces does not increase with increasing tensile strength, but remains at approximately 30,000 psi as shown in Figure 6. This strongly suggests the postulation that the fatigue strength of baked chromium plated steel is primarily dependent on the outside shell of chromium plate rather than on the fatigue limit of the steel itself.

Several investigators have studied the fatigue limit of steel plated with 0.008 to 0.010 inch of chromium from the ordinary chromium plating bath (250 g/l CrO_3, 2.5 g/l SO_4) at 158° F. The stress in such a deposit would be expected to be quite high as may be deduced from the stress measurements made on similar deposits[10, 11] and, therefore, would be expected to give a relatively low fatigue limit. Results reported by three investigators are listed in section B of Table IV and plotted in Figure 6. The fatigue limit with this deposit is approximately 40,000 psi regardless of the tensile strength of the steel.

The deposit from the same bath plated at 130° F has also

TABLE IV

SAE 4130, 4140 and 4340 Steels plated with 0.008 to 0.010 Inches of Chromium

	Steel		Plated	
SAE Type	Tensile 1000 psi	Fatigue Limit 1000 psi	Fatigue Limit 1000 psi	Reference
A. Deposits plated at 130° F and baked at approximately 400° F				
....	86*	43.3	29.8	3
4340	138	70.0	28.0	4
....	148*	74.0	34.0	3
4130	186	83.7	27.0	7
4130	186*	93.0	27.0	1
4140	211	109	30.0	Deposit 3b
4140	211	109	38.7	Deposit 6b
B. Deposits unbaked, plated at 158° F from standard sulfate bath				
4130	86*	42.5	37.5	5
4130	88*	44.0	40.0	1
4340	138	70.0	35.0	4
4130	164*	82.0	61.0**	5
4130	186*	93.0	45.0	1
C. Deposits unbaked, plated at 130° F from standard sulfate bath				
4130	86*	42.5	36.0	5
4130	88*	44.0	40.0	1
4340	138	70.0	51.0	4
4130	164*	82.0	56.0	5
4130	186	81.5	63.7	2
4130	186*	93.0	67.0	1
4140	211	109	57.4	Deposit 6a
D. Deposits unbaked, CR-110, 225 g/l bath plated at 130° F				
4130	186	81.5	74.0	2
4140	211	109	73.5	Deposit 3a
E. Special deposits, baked				
4140	222	109	104	Deposit 12c
4140	266	103	101	Deposit 12d

*Tensile strength not given by author, taken approximately as twice the unplated fatigue strength of the steel.

**This test result is out of line compared to the other results.

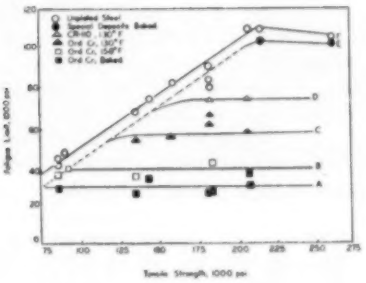

Figure 6. Fatigue versus Tensile Strength of the Basis Metal

been studied by a number of investigators and is tabulated in section C of Table IV and again plotted in Figure 6. The scatter encountered is probably due to experimental error, such as small uncontrolled differences in solution composition and in plating conditions, which would change the number of crack lines in the deposit as well as the stress, which in turn would effect the fatigue limit. It is significant to note, however, that the values fall near 57,000 psi and are not significantly higher for the stronger steels. For steels with an unplated fatigue limit below 57,000 psi (the intersection of C and F), the fatigue limit after plating is slightly below the fatigue limit of the steel.

Fatigue results are available for deposits from the CR-110, 225 g/l bath at 130° F with only two steels (Section D, Table IV). However, the steel with a tensile strength of 186,000 psi gave a fatigue strength of 74,000 psi when plated to 0.010 inch thickness while the steel with 211,000 psi tensile strength gave a fatigue limit of 73,500 psi. Again the fatigue strength of the plated steel appears to be a function of the outside shell of chromium and increasing the tensile strength of the steel fails to change the fatigue limit for the plated piece beyond the limit set by the particular chromium deposit.

Two points are also available for deposit 12. The fatigue results are tabulated in Section E of Table IV. Here, SAE 4140 steel with a tensile strength of 222,000 psi and a fatigue limit of 109,000 psi gave a plated fatigue strength of 104,000 psi after baking at 550° F while steel with the higher tensile strength of 266,300 psi and a fatigue limit of 103,000 psi gave a fatigue strength of 101,000 psi after plating and baking at 450° F.

This literature review on the fatigue strength of chromium plated steel shows that the equations developed in this discussion relating stress and fatigue may have wider application than for the particular steel used in this study. Thus, equations b and d for unbaked deposits and g for baked deposits may apply to the results of other investigators.

Another search of the literature[15, 16] reveals that the flat portions of the curves shown in Figure 6 are similar to the fatigue vs tensile strength curves shown in Figure 7 which are obtained for unplated specimens prepared with a deep notch. This suggests a mechanism by which the outside shell limits the fatigue strength of plated steel. The outside shell would withstand loads proportional to stress in the deposit until the strength of the shell is exceeded and the deposit breaks giving a notch. The fatigue specimen then fails rapidly. Increasing the fatigue strength of the unplated steel does not increase the fatigue strength of the plated piece, since the load limit of the outside dominating shell is already exceeded.

The break giving the notch effect described above should not be confused with microscopic crack lines in chromium deposits which are formed and filled in during plating, since in this case increasing the number of crack lines increases the fatigue limit. On the other hand, the stress in a deposit both before and after baking does correlate with the fatigue results. Thus, the break in the outside plated shell, which occurs as a result of the applied load plus the stress in the deposit determines the fatigue limit of the plated piece.

CONCLUSIONS

The results of this investigation, considered in the light of previous knowledge, indicate that the following conclusions are justified.

1. Stress in the chromium deposit is the primary factor in determining the fatigue limit of chromium plated steel.

Figures 2 and 3 show a linear relationship between stress in the deposit and the fatigue strength of the chromium plated steel. Low stress gives high fatigue strength while high stress gives low fatigue strength. Equations b, d and g describe this relationship for both baked and unbaked deposits.

2. Stress and fatigue are related to the number of crack lines in unbaked chromium deposits.

Figure 1 and equations b and c show the relationships between the number of crack lines in a deposit and the stress and fatigue properties.

3. Chromium deposits with negative "as plated" stress give the highest fatigue results before baking.

Deposit 1 in Table I with a stress of −17,000 psi and 3,500 cracks per inch gave a fatigue limit of 97,500 psi. This fatigue limit is compared to the value of 57,400 obtained under comparable conditions for the ordinary chromium deposit (deposit 6).

4. A general rule as to the effect of chromium thickness on fatigue properties cannot be made.

The effect of thickness is probably connected with the shape of the stress versus thickness curve for a particular deposit. Table II gives fatigue results for deposits which show almost the same fatigue strength up to 0.010 inch thickness.

5. Baking at 200 to 400° F to eliminate hydrogen embrittlement is extremely harmful to the fatigue properties of the usual chromium deposits.

Baking these deposits should either be avoided or be done at temperatures above 750° F. The use of higher strength steels does not necessarily improve the plated fatigue strength. Baking can be done at higher temperatures with softer steel and in this case is more effective in restoring the fatigue strength of the plated and baked parts. Baking at 200 to 400° F at thicknesses up to 0.001 or 0.002 inch thickness is much less harmful than with thicker deposits and would be suitable for use in many cases.

6. Certain types of chromium deposits stress relieve at temperatures below 750° F and give high fatigue results after baking.

Deposit 12 in Table I gave a fatigue limit of 90,000 psi after baking at 375° F and 104,000 psi after baking at 550° F. This compares with a value of 38,700 psi for ordinary chromium after baking at 350° F and 53,800 psi after baking at 750° F.

7. A particular chromium deposit shows a characteristic fatigue strength which is important in limiting the fatigue strength of chromium plated high strength steels.

This point is illustrated in Figure 6 which summarizes the fatigue results of this study along with those of previous investigators. The high strength steel used in this study did not show a higher fatigue limit after chromium plating than did much weaker steels with the same type of chromium deposit. Especially striking is the fact that a number of steels with tensile strengths ranging from 86,000 psi to 211,000

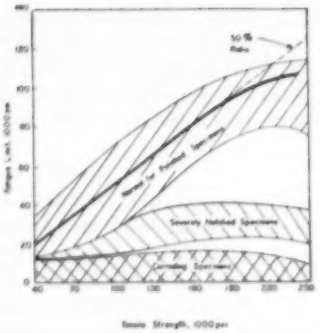

Figure 7. General Fatigue Behavior of Steel with Polished, Notched and Corroding Specimens. (Used by permission from D. Bullens, *Steel and Its Heat Treatment*, 1, 157 (1948). John Wiley and Sons, Inc.)

psi gave approximately the same low fatigue limit of 30,000 psi after plating with conventional chromium and baking.

8. The mechanism of fatigue failure in chromium plated, high strength steel appears to involve an initial break in the shell of chromium plate which then acts as a notch in rapidly inducing complete failure.

Figure 7 which illustrates the fatigue versus tensile strength relationships with notched specimens, shows a marked similarity to Figure 6 for chromium plated steels. Such a mechanism would be more active when the fatigue strength of the base metal exceeds the fatigue strength of the chromium deposit.

ACKNOWLEDGMENT

The data reported here are a part of a larger study on the fatigue properties of chromium plated steel conducted from July 1952 to December 1955 by United Chromium Research Laboratories for the Protective Coatings Division, Wright Air Development Center, Wright Patterson Air Force Base, Ohio. The authors wish to thank the above organization for permission to publish these data.

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Seyb

EDGAR J. SEYB, JR.

Edgar J. Seyb, Jr., was born in Pretty Prairie, Kansas, and received his early education there. At Sterling College, Sterling, Kansas, he majored in Chemistry and Physics and received his AB degree in 1946. He accomplished a PhD in Inorganic and Physical Chemistry at the University of Kansas in 1950. Dr. Seyb joined the Research Labs of United Chromium, Inc., from the University of Kansas and has been associated continuously with electrodeposition research.

Tulumello

ANGELO C. TULUMELLO

Angelo C. Tulumello was born in New York City and received his early education there and in Pennsylvania before coming to Detroit. He received his High School and Collegiate training in Detroit, obtaining the BS degree in Chemistry from the University of Detroit. On graduation, Tulumello joined the research staff of United Chromium, Inc., where he has been employed the past two years. In addition to his research activities, he is continuing his training in the Graduate School of Wayne University.

Stareck

"JESSE" STARECK

"Jesse" Stareck was born in Petersburg, Mich., in 1905. He attended the University of Kansas and received his MA degree in Chemistry in 1930 from the University of Kansas Graduate School; his PhD from the same school in 1934. While working on the thesis for his doctorate, Dr. Stareck discovered the method of color plating later to become known as Electrocolor. In 1933, he was awarded the Roy Cross Research Fellowship to further his studies of color plating. He joined the Research Staff of United Chromium, Inc., in 1935. At Unichrome's Waterbury, Connecticut, Labs., he continued his researches and developed a process of electrodepositing patterns, known as Patternplate. For these contributions, Dr. Stareck received the Edward Longstreth Medal from the Franklin Institute in 1939. In 1941, Dr. Stareck moved to the Detroit Research Labs of United Chromium as Director of Research. Dr. Stareck is active in the ACS, the Electrochemical Society, the Electrodepositors' Technical Society, the Engineering Society of Detroit, and the ASTM. He is a member of the Detroit Branch of the AES.

STEVENS *Slants* ON METAL FINISHING

"FROM THE CASTING OR STAMPING TO THE FINAL FINISH"

PLYMOUTH

1956 Plymouth Belvedere Four-Door Sedan

PUTS THE *FORWARD LOOK* IN METAL FINISHING

In the Plymouth Division's all new multi-million-dollar V-8 engine plant, where new concepts of quality control and manufacture have been incorporated, a Frederic B. Stevens, Inc., automatic "Little Steve" machine has been installed for tin immersion plating of pistons.

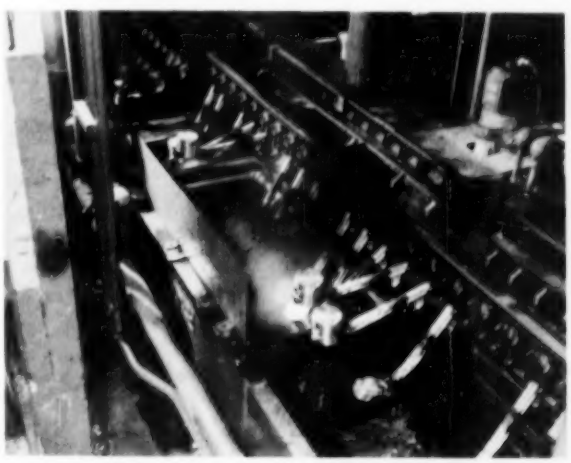
Plymouth's "Little Steve" is also equipped with automatic load and unload devices and can easily handle the production requirements of 1,600 pistons per hour. In fact, the Plymouth machine has been designed so that additional arms can be added at any time to increase the production rate.

"Little Steve" Pays Off

"Little Steve" is a recent development of Frederic B. Stevens, Inc. It is a space-saving, low-cost automatic plating and/or immersion processing machine using arms (as shown in the Plymouth installation) or racks which are placed on the arms. When racks of small parts are used it is capable of processing or plating up to 40,000 pieces per eight hour day.

The size of the "Little Steve" makes for easy installation in most plants. It offers no floor overload or ceiling height problems. Furthermore, it fits in most factory bays between structural members. Small over-all size and smaller tank size means low solution expense. The capital investment is low, too – low enough to enable many companies to now have their own automatic installation.

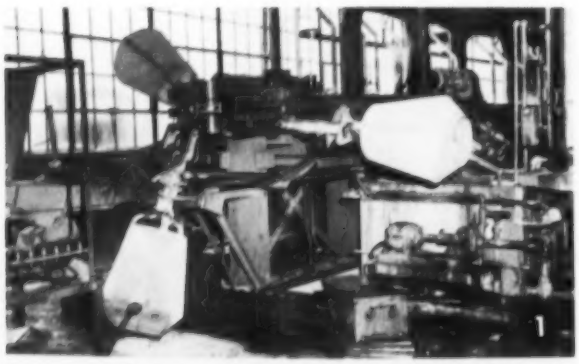
If you would like further information about "Little Steve" write today to Frederic B. Stevens, Inc., Detroit 16, Michigan, or call your local Stevens Sales Engineer.



"Little Steve" automatic machine for immersion tin plating at the new Plymouth V-8 engine plant.

STEVENS *Slants* ON METAL FINISHING

STEVENS CONTRIBUTES TO THE *"FORWARD LOOK"* EXPANSION PROGRAM AT CHRYSLER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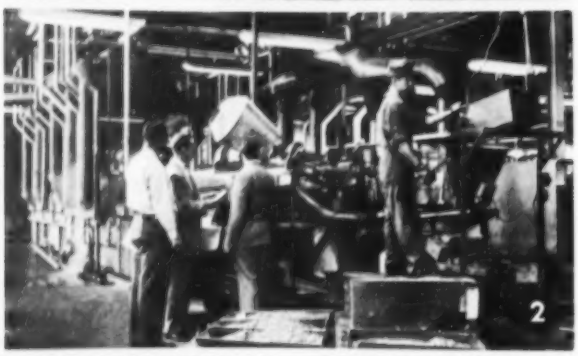
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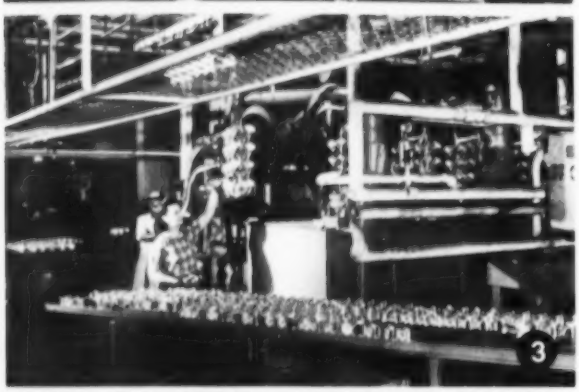
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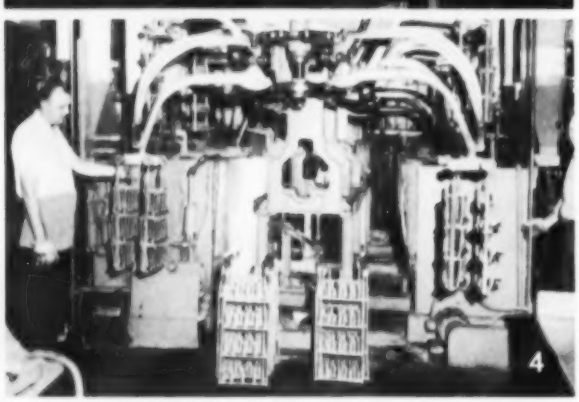
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In the modernized and new Chrysler Corporation plants in and around Detroit, Michigan, many Stevens automatic metal finishing machines and still tank lines are helping to maintain Chrysler's stepped-up production along with even higher standards of quality.

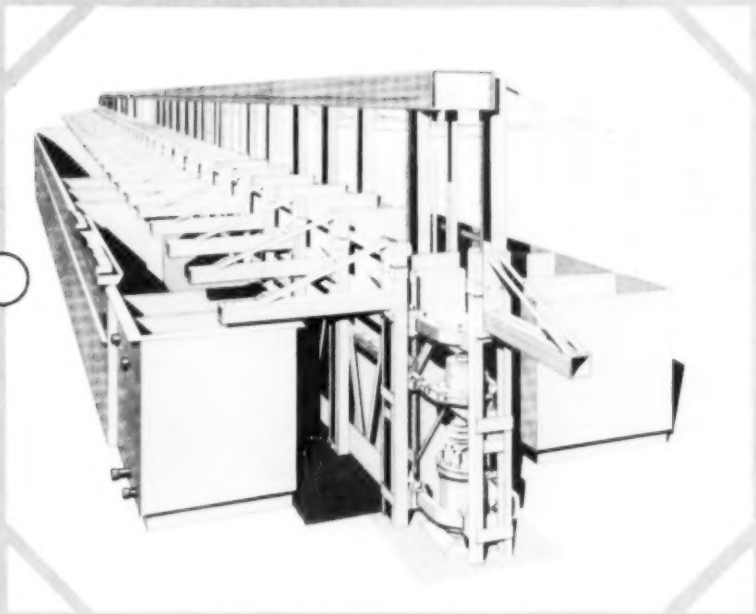
These Stevens installations are used for a variety of purposes. At the Chrysler Highland Park, Michigan, plant a Stevens Super "E" Automatic Barrel machine (illustration No. 1) is used for phosphating of small engine and chassis parts. At the Chrysler Jefferson plant in Detroit a Stevens Model "C" Automatic Barrel Plating machine (illustration No. 2) is used for zinc plating. The big Dodge Main plant has in operation a Stevens Model "B" machine (illustration No. 3) for tin coating of Dodge pistons, while still another Model "B" Automatic is in use at Dodge Main (illustration No. 4) for the rustproofing of engine and drive parts.

Chrysler Corporation also has installed Stevens metal finishing and processing equipment in the Evansville, Indiana, factory; in the big plant at Windsor, Ontario; and at the Tank Arsenal. There are numerous still tank installations at the various factory facilities, including one for specialized plating of jet engine parts at Warren, Michigan.

Your metal finishing requirements may call for numerous processes like Chrysler's or others such as nickel, chrome and copper plate, bright dipping, pickling or anodizing as well as polishing or buffing. Whatever your needs, Stevens has the complete line of equipment to meet those needs. We will recommend the right equipment for the job, and engineer and build the complete package. There is no need to shop around for special items of equipment.

STEVENS *Slants* ON METAL FINISHING

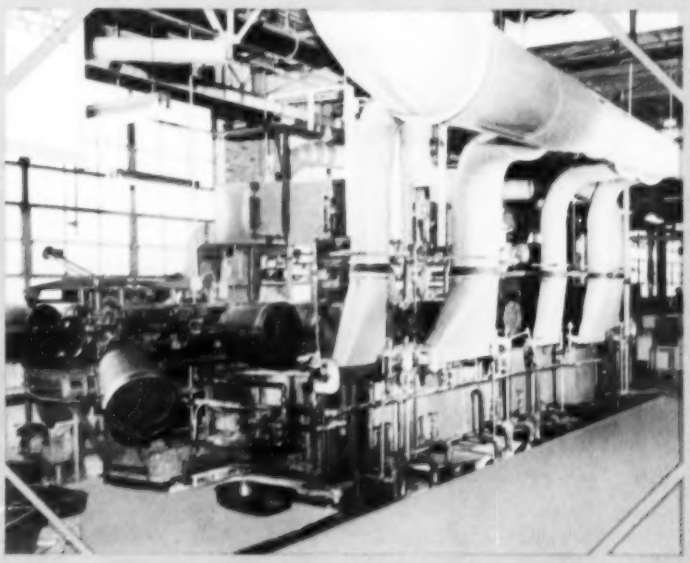
A page from the
STEVENS SCRAPBOOK
First complete family of Automatic Plating and Processing machines.



Perspective drawing of a typical "Stevadoer" featuring adaptable load capacity, mechanical flexibility and high lift. It can be truly said that the "Stevadoer" meets tomorrow's combined safety and production requirements. Although on the market less than a year, nine different processes have already been adapted to this versatile unit. The most popular have been anodizing, paint preparation, rustproofing and copper-nickel-chrome, and zinc electroplating.

"Stevadoer" himself—symbol of the Stevens machine bearing his name. First advertised to the metal finishing industry in January 1955, it has become a phenomenal success. In less than one year over $2,000,000 in "Stevadoer" orders have been placed representing a total rack traveling distance of nearly one-half mile.

Stevens Automatic Barrel Processing Machine installation at Motorola, Inc., used for copper plating small parts. No lids, no covers, no clamps, that's the story behind every Stevens Automatic Barrel unit. In addition there is no operating mechanism submerged in any solution and no corrosion problems since the unit is easily ventilated. Furthermore no auxiliary dryer or transfer unit is required. Note: Complete dryer (either gas or steam heated) is installed as an integral part of the Stevens unit.



STEVENS *Slants* ON METAL FINISHING

TIPS AND TATTLE

The trend is definitely up in the use of aluminum in the 1956 model cars. And there is much more planned for 1957. Grilles, hub caps and instrument panel units are being anodized, then dyed. A colorful effect is the result. We're happy to say that Stevens automatic machines are being used for this work in the majority of the automobile plants. If you are interested in anodizing, plating, or buffing and polishing of aluminum we can help you. The Stevens staff has years of experience which is yours for the asking.

• • •

The trade press has featured several articles in recent months on subjects that are of interest to those in the metal finishing industry.

"In-Plant Plating Moves Diversified Product Line Faster!" – Stevens automatic barrel plating installation at Unistrut Corporation cuts down a 5 to 7 day minimum delivery time to a few hours – *The Iron Age*.

"You Can Cut Your Plating Costs!" with the proper waste disposal system – *Factory Management* and *Maintenance*.

"Bright Dip Line For Aluminum and Brass" – now even the small operator can profit from machine dipping – *Steel*.

Reprints of a few of these and other related articles are available to you from your Stevens Sales Engineer or home office.

• • •

Water pollution and shortages are increasing year after year and water conservation is becoming a national problem. Industry as well as the government is taking a hand in corrective measures. In rinse water alone shops and plants doing electroplating use millions of gallons per year. There are ways of using these rinse waters over and over with waste disposal and other systems. Stevens has been in the thick of this problem, as it applies to metal finishing, for several years. We will be glad to be of help to you.

• • •

One of the hottest tips we have been able to pass on for some time is the report of a large manufacturer of brass and bronze plumbing supplies. They have at least *doubled* the life of their polishing belts by using Stevens Belt Grease. In addition to this saving they have discovered that by cleaning their belts, at regular intervals, in a suitable solvent, the Stevens Belt Grease comes off and carries the metal particles with it. This operation removes the "glaze," restores the belt to its original condition, and the belt is ready for a second application of Belt Grease and continued use. This cleaning operation and lubrication extends total belt life approximately *four times*.

• • •

You may benefit from this experience we picked up not so long ago regarding degreasing units. In placing the degreasing unit in your plant be sure it is protected from strong cross-drafts. In a strong cross-draft, material will be wasted through excessive evaporation, and the vapors may drift to other sections of the plant.

THE FINISHING TOUCH

PRECISION FINISHING METHODS

by D. J. Swaninger
Sales Manager—
Stevens Compositions

Stevens experience and experimental work for customers with jobs calling for micro-inch surface specifications, edges with exact radii and surfaces prepared for minimum thickness limits, has shown that there is usually a method or product that does it better.

Sisal Buff Polishing—Where fast cutting action and blending of polishing lines is required on steel surfaces prior to plating, use a Sisal Buff along with Stevens #414 Steel Compound in bar form or Stevens #3-L

Liquid Compound. They provide the cutting action and prolong the life of the wheel.

Tampico Brushing—Maximum flexibility for difficult contours such as deburring precision gears and other operating parts. Longer life and faster cutting action is provided when used with Stevens Emery Paste and special Tampico compounds.

Cloth Buff Deburring and Polishing—Available in a wide variety of types, are used with Stevens greaseless compositions for the finest satin finishing operations, also for polishing and deburring critical edges and areas.

Cloth Buff Coloring—For coloring copper-plated surfaces having a thin deposit, where nickel-chrome is to be deposited directly on the copper—Stevens White Rose Lime Composition brings up a beautiful luster with minimum removal of plated metal. It flows the copper without cutting through.

We are always at your service in solving polishing and buffing problems. Write today.

FREDERIC B.
STEVENS
INCORPORATED
YOUR METAL FINISHING SUPERMARKET
DETROIT 16, MICHIGAN

IMPROVEMENT IN ELECTROPLATING DUE TO ULTRASONICS*

By Stanley R. Rich†

A preliminary investigation has been made into improvement of electroplating due to ultrasonic irradiation during the plating process. The results reported here have tended to establish that while high frequency ultrasound produces certain undesirable effects, low frequency vibration at 20 kilocycles per second: (a) eliminated anode polarization, (b) permitted plating at accelerated rates of up to 30 times normal speed, (c) minimized and often eliminated edge buildup, (d) produced extremely uniform and well bonded coatings. An investigation into the novel possibility of simultaneously cleaning, descaling and electroplating in a plating bath irradiated by ultrasonics showed that even dirty, rusty and grease coated parts can be plated in a single operation producing excellent coatings. While this is not advocated for production since the plating bath can become contaminated, the results show that rejects will be reduced if occasional pieces happen not to be completely pickled and cleaned in preplating procedures.

It has long been known that one of the chief difficulties encountered in electroplating as well as in other surface-chemical processes is the formation of stagnant layers of electrolyte in the vicinity of electrodes. In electroplating, the electrolyte in the immediate vicinity of a cathode is depleted of metallic ions which have been deposited on the object to be plated, leaving this very thin layer of solution essentially stripped of further material that can be plated. In the case of the anode, the opposite condition becomes true in many cases. The electrolyte in the immediate vicinity of positive anodes becomes saturated with metallic ions which have been removed from the anode and this saturation prevents further removal of anodic metal until diffusion or removal can take place to reduce metal ion levels below saturation.

The existence of these stagnant layers places a limit on the rate at which plating can be accomplished, as excess current merely produces poor and in many cases blackened and burned coatings. These difficulties are overcome, to an extent, by the use of agitation or rapid scavenging of stagnant exhausted or saturated electrolyte layers with resulting acceleration and improvement. This is well known in barrel plating in which agitation is forced to occur. Thus, in such baths, plating rates can be increased and, in many cases, considerable acceleration and improvement can be effected. However, there are many types of parts that cannot be barrel plated and there are other difficulties which are not necessarily overcome by such procedures. It was for these reasons that an investigation was conducted into the use of ultrasonic irradiation for the improvement of electroplating.

Ultrasonics is a term given to the physical vibration of particles at a frequency which is above audibility for the human ear. This is defined as vibration above 16,000 cycles per second. In practice, the ultrasonic frequency spectrum is generally taken to include the range 16,000 cycles per second to several million cycles per second. These vibrations are produced by vibrators that are known as transducers which receive their energy from conventional sources of high frequency power such as electronic or vacuum tube generators on the one hand or motor-alternator equipment on the other. In general, the range of frequencies has been essentially divided into two sections for purposes of convenience and these are referred to as low frequency and high frequency ultrasound. Low frequency ultrasound is generally taken to mean irradiation at approximately 16 to 30 kilocycles per second and high frequency ultrasound has been taken to mean irradiation at a frequency of about 50,000 vibrations per second and above.

In the past, investigations of applications of ultrasound to various types of surface phenomena including cleaning, pickling and electrochemistry have been limited to relatively small scale applications. This has been due to the limitations of transducers which have been mainly confined to small pieces of piezoelectric quartz, small unprotected ceramic transducers such as barium titanate and the use of certain special magnetic materials such as nickel. Metals such as nickel display a strong change in dimensions when placed in a magnetic field, and they can be made to vibrate under certain circumstances due to a phenomenon known as magnetostriction.

The present investigation was initiated because of the development of very large scale ultrasonic irradiating equipment capable of furnishing ultrasonic irradiation in tanks of nearly indefinite size.

This equipment is all-stainless, welded and hermetically sealed. It is designed specifically for use in most kinds of industrial liquids. In view of the availability of this equipment for operation at either high or low frequency, an investigation was undertaken to develop possible improvements in electroplating by the use of ultrasonics. The results of the study can be applied to large-scale processing by the use of the newly developed ultrasonic equipment.

In the investigation reported in this paper, both high frequency and low frequency ultrasound were employed. The important differences between high and low frequency ultrasonic irradiation are principally:

(1) Particle displacement for a given amount of power is inversely proportional to frequency—and is thus much larger at low frequency than at high frequency.

(2) The wave length of the sound in any medium such as a liquid bath is also inversely proportional to frequency.

The result of these two differences is to produce entirely different effects. In this investigation, these effects have been discovered as extremely important, especially as applied to electrochemistry and specifically in plating.

The effects of importance due to ultrasonic irradiation are principally: a phenomenon known as cavitation and those effects that are due to the wave length of ultrasonics in the liquid bath being irradiated. Cavitation is the term given to what is perhaps the most important effect of ultrasonics in

*This paper was presented at the 42nd Annual Convention of the AES in Cleveland, Ohio. The discussion following the presentation is not included here, but will be found in the "Proceedings of the AES."

†Vice-President and Technical Director of The General Ultrasonics Company, Hartford, Connecticut.

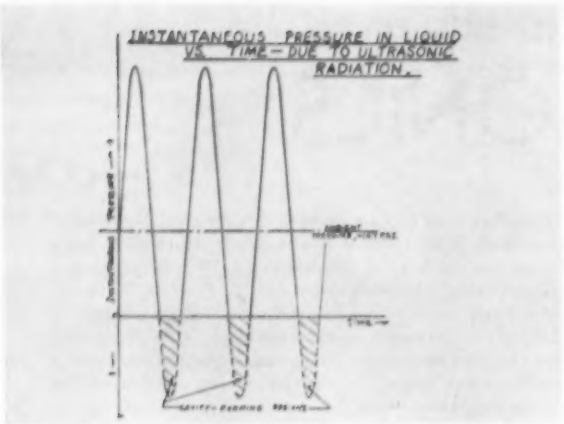


Fig. 1. Instantaneous Pressure vs Time, due to Ultrasonic Radiation

surface chemistry and electrochemistry. It can be explained as the minute rupture or fracturing of the liquid being irradiated due to the fact that the alternating pressure produced by the transducer in the liquid is sufficient to lower the instantaneous pressure at any point in the liquid to below vacuum or zero. This is best explained by reference to Fig. 1. The ambient pressure, or approximately 14.7 lb/sq in is shown as a dotted line. The super-imposed alternating pressure produced by the vibrating transducer in the liquid is shown by the solid line and, starting from the left side of the graph, it is seen that this pressure alternates about the ambient pressure and can achieve very high values, dependent only on the amount of power put into the transducer and radiated into the liquid. When this maximum alternating pressure exceeds in magnitude the static ambient value, a vacuum or negative pressure is produced on negative half cycles as shown.

In most ordinary liquids, negative pressures cannot be sustained since most liquids have no tensile strength. The liquid separates by fracturing into many thousands of tiny cavities, usually throughout the volume of the liquid at low frequencies and in certain specific zones at high frequencies. These cavities are vacuum-filled at first and gradually develop a pressure which is very low—namely the vapor pressure of the liquid in which the cavitation is taking place. The bubbles finally collapse and they do so with great force concentrated in a very small space. This formation and collapse of vacuum or low-pressure cavities is known as cavitation and it is responsible for what has become known as the vigorous scrubbing action of ultrasonic cavitation. Cavitation is far more intense at low frequency compared with high frequency ultrasonic irradiation for a given power input. This is due to the fact that particle displacement for a given power is inversely proportional to frequency. That is to say, at constant power, the actual physical movement of a given molecule of liquid will be 20 times greater at 20 kilocycles per second than at 400 kilocycles per second. Consequently, the vacuum cavities that are formed during cavitation are correspondingly much larger than those formed at high frequency and they collapse with a great deal more destructive—or working—energy. Finally, cavitation will tend to occur wherever there is a weak point in a liquid. This is, of course, ideal for most surface electrochemistry applications, since the weakest locations in a liquid are always formed at boundaries or interfaces with other materials such as solids or gasses. Inasmuch as electrodes in a plating bath and escaping gas at those electrodes are the weakest points in the liquid, the fluid tends to fracture or cavitate at the surfaces upon which it is most desirable to obtain cavitation.

Cavitation is achieved in most liquids by producing an amount of power in the liquid of approximately 0.6 watts/sq cm of transducer surface area. This is true throughout most of the frequency spectrum. However, as noted above, the activity of the cavitation is a great deal more effective for a given amount of power at low frequency as compared with high frequency. It has been found in many applications that many more times as much power is required to do a given cleaning or pickling job at high frequencies such as 400 kilocycles per second compared with low frequencies such as 20 kilocycles per second. A further distinction between the two frequency ranges is perhaps even more important and this is due to the differences in wave length of sound in the liquid.

The velocity of sound in most liquids is approximately 1.5 x 10^5 cm/sec. This means that at a frequency of 20,000 cycles per second the wave length of the sound wave in such liquids is 7.5 centimeters. At high frequences, such as 400 kilocycles per second, the wave length is only 0.375 centimeters and these values—which are encountered in almost all liquids of importance in this paper—give rise to some exceedingly annoying difficulties in the high frequency range. This is due to the fact that short wave lengths are always accompanied by sharp focusing, shadowing and considerably varying intensity of sound due to "standing waves" in most baths. An analogy to this situation can be drawn with the more familiar problems of radio and television communication. It is well known that at longer wave lengths such as in the ordinary broadcast band, good reception can be obtained in valleys, between buildings, etc. while at shorter wave lengths such as those encountered in television, it is necessary to provide antennas raised high into approximately the path of the radiation in order to obtain good results. The same is true in ultrasonics, in that low frequency or long-wave vibrations will tend to reach around the corners of obstacles by diffraction and so tend to eliminate shadowing while high frequency irradiation produces many problems produced by zones and shadowing as will be noted below in the discussion of the investigation reported here.

It is seen from the foregoing discussion that low frequency irradiation with ultrasound will produce intense cavitation, especially in the vicinity of surfaces of metals and places where gas will evolve in various kinds of liquid baths. It is therefore expected that the irradiation of an electroplating bath with ultrasonics will produce intense cavitation in the vicinity of electrodes and that this cavitation will cause active scrubbing of these surfaces and replenishment of exhausted or saturated layers of electrolytes with fresh fluid from the body of the bath. Therefore, it was expected that it would be possible to greatly increase electric current input into plating baths because of the stirring that occurs due to ultrasonic cavitation which would, in this sense, permit essentially barrel plating conditions to exist in a still bath. It was also expected that the violent scrubbing activity of ultrasonics would tend to remove any electroplating that was not firmly bonded and would tend to minimize or eliminate the buildup normally encountered around corners and edges of the parts being plated. It was also expected that low frequency irradiation would produce better and more uniform effects than high frequency irradiation. These expectations were confirmed by the investigation reported below.

The ultrasonic equipment used in the investigation were: (1) a generator which develops 400 watts of power over the

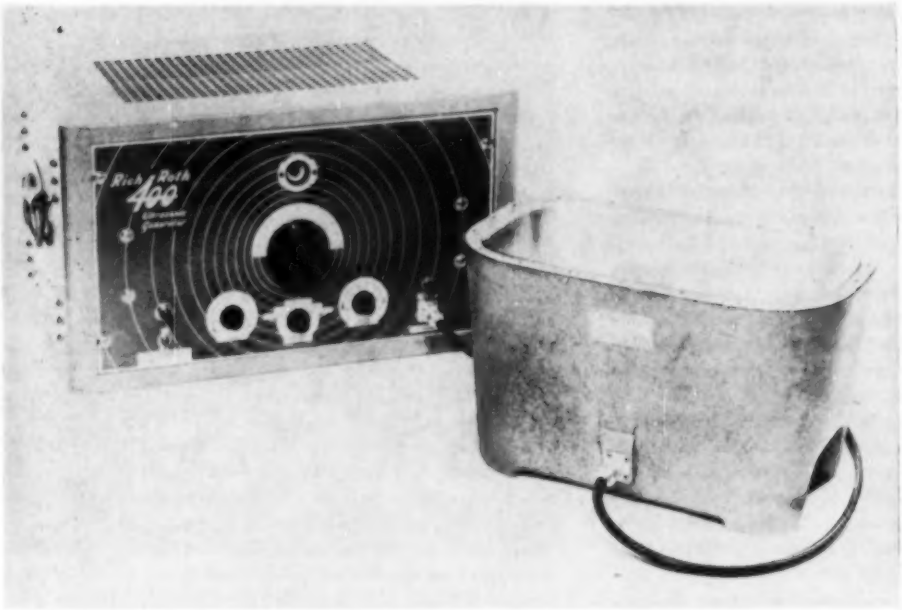


Figure 2
T-1 Stainless
Trough Sonicell.
General Ultrasonics
Rich-Roth "400"
Generator

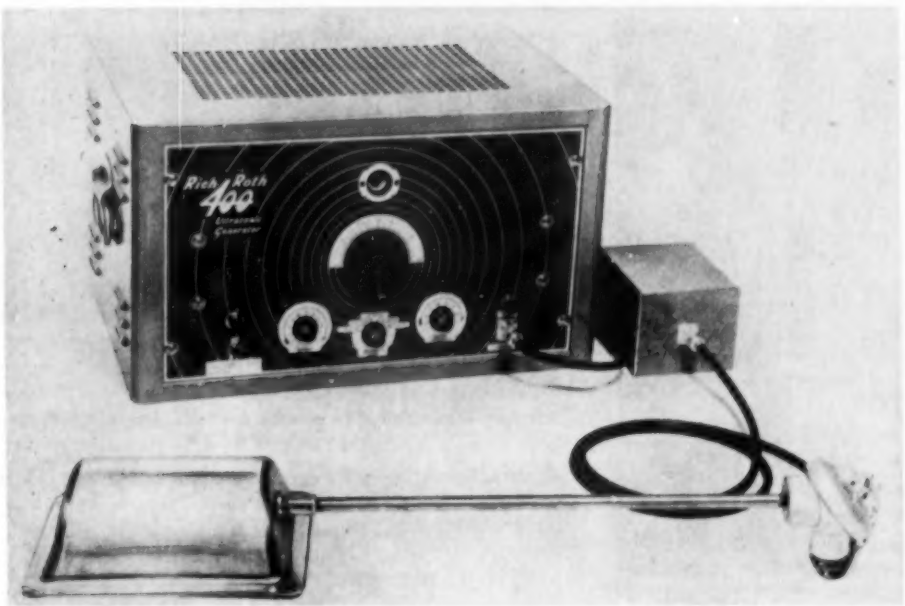
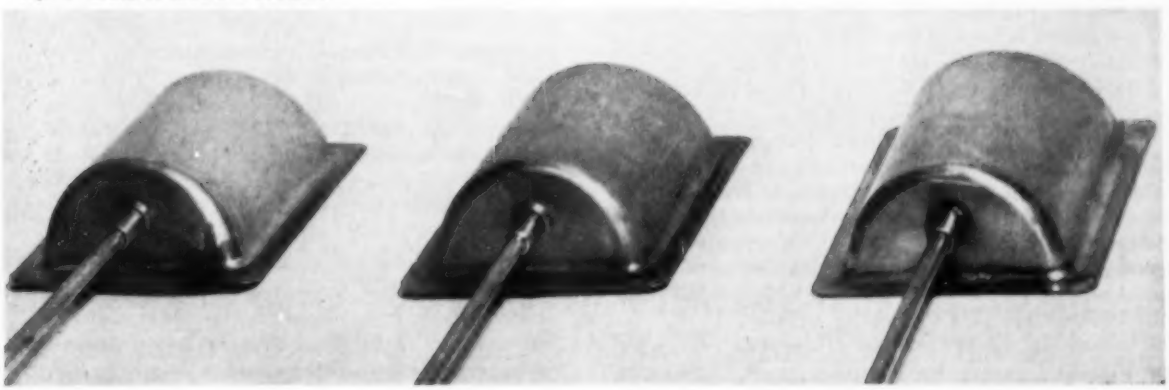


Figure 3.
D-1 Immersion
Sonicell
with General Ultrasonics
Rich-Roth
"400" Generator

Fig. 4. Group of three D-1 Sonicells



frequency range 10 to 1200 kilocycles per second; (2) the T-1 Sonicell, a trough-shaped stainless steel ultrasonically irradiated chamber, holding 2 gallons of liquid; (3) the D-1 Sonicell, an all-welded stainless-steel immersion unit for immersion into small tanks of up to 1 sq ft of side or bottom area. The generator and Sonicells are shown in Figs. 2, 3 and 4, respectively.

The first experiments in the use of ultrasonics in electroplating were conducted in the cyanide cadmium process. A standard cyanide cadmium bath was prepared with a cadmium anode. Standard samples of known thickness were prepared for plating. These were steel strips 1 inch wide and 4 inches long which were pickled and cleaned in preparation for plating. They were masked so that an area of 1 inch square was exposed on each side of the strips which were to be plated. Fig. 5 is a photograph of typical results. The darkened coating shown at the left side of the figure is that of one of the steel strips which was electroplated with cadmium in the absence of ultrasonics. This was the control piece and the typically "burned" coating was due to plating at a current density of 250 amp/sq ft. The center piece is the sample that was irradiated with 20 kilocycles per second ultrasound at the same plating current of 250 amp/sq ft and it is seen that a bright coating was obtained, free from burning and also free from any edge buildup. The piece that was not

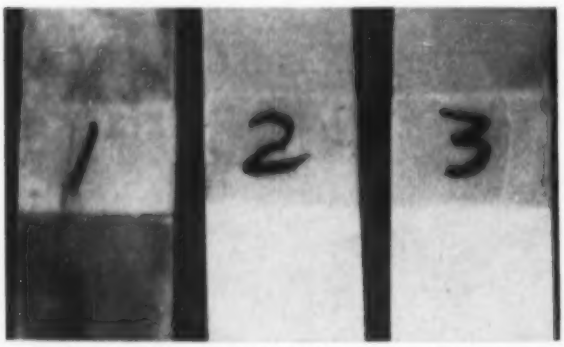


Fig. 5. Cadmium Plated Steel Strips with and without Ultrasonics

irradiated showed a considerable amount of fur along its edges. The third sample shown at the right of Fig. 2 was irradiated at 20 kilocycles per second and electroplated at a density of 500 amp/sq ft. Here too, excellent results were obtained which were impossible in the still bath without the use of ultrasonics. Further experimental samples were plated in the presence of ultrasonic irradiation and excellent coatings were obtained at current densities up to 750 amp/sq ft. Subsequent examination showed that the coatings obtained in the presence of 20 kilocycle per second ultrasonic irradiation were deposited at up to 0.6 mils of cadmium per 3 minutes of plating time. It was not possible to examine the non-irradiated piece in a similar fashion because of the extremely rough coating obtained without ultrasonics.

The ultrasonic power level in this and subsequent tests was found to be uncritical so long as cavitation level was exceeded. As noted above, this is achieved at levels of about 0.6 watts/sq cm. In addition, there is evidence that will be further investigated to show that still lower power may be practical, perhaps due to the increased ease with which cavitation appears to occur due to gas evolution and the chemical reactions that take place at electrode surfaces.

The same experiment was repeated using 400 kilocycles per second and the expected results were obtained. In this case there were alternate bands of bright and burned coatings which were due to the standing wave pattern obtained because of the very short wave length of ultrasound at 400 kilocycles per second as noted above. In addition, the bright areas were found only on the side of the test piece which was placed so that it faced the ultrasonic transducer with only slight brightening obtained on the surface away from the vibrating element. In the case of low frequency irradiation, the cavitation could be seen reaching around the corners of the pieces being plated producing what appeared to be uniform coating on all sides of the irradiated electrode.

In this preliminary investigation, additional pieces were irradiated and plated during irradiation to see if throwing power is improved in the presence of ultrasound, and it was found that good plating was obtained on inside threads down to and including the roots of these threads in large steel cap nuts one of which is shown in Fig. 7.

Thus, our preliminary investigation showed that ultrasonic irradiation at 20 kilocycles per second produced negligible or zero shadowing or variation from one area to another, permitted considerable acceleration of electroplating, reduced or eliminated edge buildup, and it was therefore appropriate to investigate other effects of the irradiation. At this time a study was made into the effect of ultrasonic irradiation on

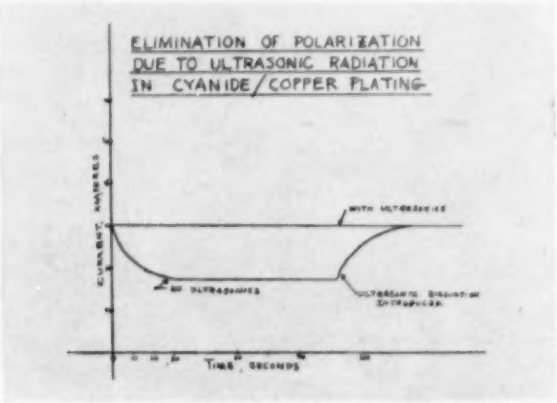


Fig. 6. Elimination of Polarization due to Ultrasonic Radiation in Cyanide/Copper Plating

anode polarization with the results shown in Fig. 6. Here, the dotted curve is that of plating current into the bath for a given applied voltage vs time in the absence of ultrasonic vibration. It is seen that in this particular experiment—which is typical of most of the others conducted in this type of solution—the current output to the bath fell by approximately 50 per cent within about 1 minute after the onset of the operation. The solid curve, which is simply a straight line, was taken in the same bath in the presence of ultrasonic irradiation. This elimination of polarization is believed due to the scrubbing action of the ultrasound in removing gas bubbles which tended to collect and adhere to the anode and also due to the removal of the stagnant layers of electrolyte around both anode and cathode, preventing both anodic and cathodic polarization. Similar results have been obtained in cadmium-cyanide plating baths and in acid hard-chrome plating experiments as well as in silver-cyanide solutions.

It was at this time that an investigation was made into the novel possibility that the scrubbing or cleaning effects of ultrasonics could be combined with the electroplating operation to produce electroplating on contaminated surfaces ordinarily considered impossible to plate.

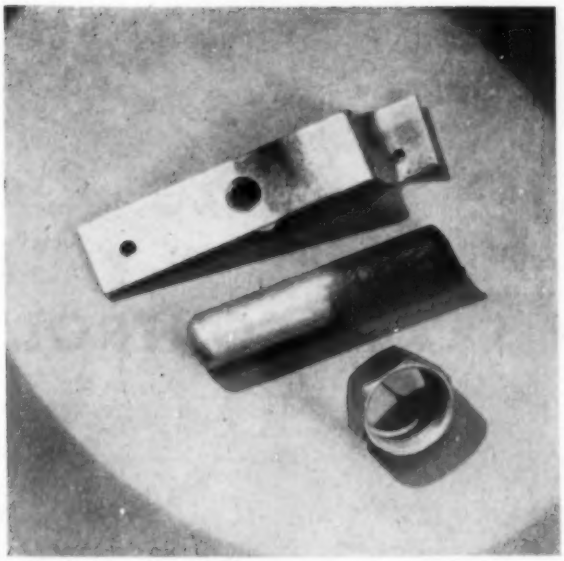


Fig. 7. Examples of Cadmium Plating of Improperly Cleaned Samples made possible by Ultrasonic Radiation

Fig. 7 is a photograph of a number of typical examples of this procedure which proved to be extremely successful. The pieces shown in the figure were all corroded with rust as well as contaminated with various types of grease. These contaminations included deliberate marking with a grease pencil, with fingerprints and with machine oil. The tubular piece shown at the right is an oxide coated copper tube taken directly from a hot drawing operation. In all cases the ultrasonic irradiation resulted in the simultaneous pickling and removal of surface contaminants and electroplating with an extremely fine-grained cadmium coating as soon as the contaminating oxide or other dirt was lifted away from the piece. This discovery is listed here as part of the results of our preliminary investigation not to advocate the elimination of any specific cleaning processes but for general informational purposes. It is obviously undesirable in most cases to contaminate a plating bath with various kinds of oxides and unknown surface soils. However, the significance of this finding lies in the fact that it is expected as a result to be able to obtain a much lower reject rate in normal plating operation when ultrasonic irradiation is introduced into the plating tanks. This is due to the fact that surface contamination may remain on pieces to be plated despite all efforts to remove them in the normal course of descaling and cleaning operations. However, with ultrasonics, such soil may not prevent good plating from being achieved. On the other hand, it is possible that it may be practicable in certain cases to eliminate some of the cleaning procedures performed in connection with preplating operations if it is possible to filter the plating bath on a continuous basis. It is noteworthy here that it was possible to continue to contain useful plating operation even when the plating baths became opaque due to the amounts of contamination that were removed from samples processed during the investigation. It is believed that the ultrasonic cavitation at the surfaces of the electrodes prevents any grease from settling out on these structures even when the plating bath is laden with oil and other contaminations.

Results similar to those reported above in connection with the cadmium plating investigation have been achieved in connection with copper, silver and chromium plating. Specifically, silver plating at similar high rates of speed was obtained without the usual chalky character of the resulting coating. At very high rates of deposition the silver had the frosted appearance normally obtained under such conditions, but the material was tightly bonded and did not scratch or abrade away from the part being plated even at rates of deposition of 10 to 15 times normal.

In copper, the results are similar to those obtained in cadmium although our investigation has been on a very preliminary basis, up to the present time. In hard chromium, acceleration by a factor of 5 was obtained with almost negligible buildup at edges or corners.

The question of throwing power is under investigation at the present time with the preliminary indication that deposition is obtained displaying greater ability to plate into holes and corners than was previously thought possible.

Finally, a preliminary investigation has been made into the effect of ultrasonic irradiation at 20 kilocycles per second on electroless nickel plating. In this case, an alkaline electroless nickel bath was prepared and rates of deposition were measured both with and without ultrasonic irradiation. The temperature of the bath was approximately 95°C and a prepared series of samples were immersed in the solution with and without ultrasound. The rate of deposition in the absence of ultrasound was approximately 0.2 mils of electroless nickel in about 45 to 55 minutes of immersion. When ultrasonic irradiation was introduced into the bath, 1.0 mils of nickel were deposited in 15 minutes and the resulting coating was shinier and appeared to be more lustrous than the coating in the absence of ultrasonic irradiation.

The findings reported above are the results of a preliminary investigation into the effects of ultrasonic irradiation. Further and more extensive investigations are now underway and will be reported at a later time.

[1]The General Ultrasonics Company Rich-Roth "400" generator.
[2]The General Ultrasonics Company Type T-1 Sonicell.
[3]The D-1 Sonicell.

STANLEY R. RICH

Rich

Stanley R. Rich was born in 1917 and received the BEE degree from the School of Technology of the College of the City of New York. His graduate study at Brooklyn Polytechnic Institute and at Harvard University was in Physics and Geophysics. He holds patents in many fields, including ultrasonics, automatic machinery, magnetic devices, special electronic circuits and navigation systems. He is a member of Sigma Xi, The American Association for the Advancement of Science and the American Acoustical Society.

Rich is Technical Director and Vice-President of The General Ultrasonics Company of Hartford, Connecticut, the principal designer of the equipment manufactured by that organization, and the originator of their ultrasonic plating and pickling process.

Prior to the formation of The General Ultrasonics Company, Rich was a partner in Rich-Roth Laboratories from 1950 to 1955 and the co-inventor with Dr. Roth of the Ultra-Viscoson which uses ultrasonics to measure viscosity.

From 1945 to 1950, Rich was at Raytheon Manufacturing Company, where he was in charge of ultrasonic and servomechanism research and was responsible for the first ultrasonic machine tools manufactured at that firm. At the Submarine Signal Co. Div. of Raytheon, he headed the long-range missile guidance program and originated scanning sonar systems.

During World War II, Rich originated and developed scanning sonar equipment for the Navy both as a civilian engineer and as a member of the Harvard University Underwater Sound Laboratory, for which he received official Navy commendation.

SOME ASPECTS OF SOLUTION LEVEL CONTROL*

This paper is unique in that it is the joint effort of a committee of the Indianapolis Branch of the American Electroplaters' Society. It is hoped that in addition to working out a paper that will be of general interest, the authors can also demonstrate that such committee action can be productive and that it will encourage other branches to increase their efforts on papers of a practical nature. If each branch could produce only one paper per year as a joint undertaking, it would give PLATING a much greater selection of papers and result in an improvement in the magazine. There is not a member of the American Electroplaters' Society who, in his own operations, does not have material that would be of interest to others. This information should be made available.

ABSTRACT

Of all the variables encountered in plating, possibly the most neglected is solution level. Generally, little thought is given to this subject and, as a result, it is overlooked as one of the most important controls in plating. It is the object of this paper to emphasize the many relations of solution level control and to review some of the methods employed to accomplish better control. It is realized that any system has some shortcomings and these are pointed out.

RELATIONS

In normal plating operations, it is known that solution levels should be maintained, but the authors question if many ever stop to think why, how accurately, or how important it is. How many fish have been killed due to tanks overflowing? How many thousands of dollars in chemicals have been wasted? How many rejects have been caused by the parts not being completely covered in the cleaner or other solutions in a plating cycle? It is known that these things happen and could be prevented by proper solution level control.

Another important consideration is crystallization, caused by solutions being concentrated as evaporation takes place. Crystals form on the exposed portions of anodes and tank as the solution level goes down. When the tank is hurriedly filled, these crystals do not readily dissolve and remain as suspended matter in the solution. This results in rough deposits. Proper solution level control would minimize this problem.

In the analyses of plating solutions it is considered very important that the results be accurate. A solution that normally runs 40 oz/gal of nickel sulfate is expected to be analyzed to within 0.1 oz/gal and controlled within 1 oz/gal. When the sample is taken from the tank, little thought is given to the accuracy of the solution level. In a 40 inch deep tank at 40 oz/gal an error of 0.1 inch solution level is equal to 0.1 oz/gal analytical error, or 1 inch is equal to 1 oz/gal in analytical error. The analyst prepares accurate standard solutions, uses closely graduated glassware and analytical balances to analyze samples of solutions with solution levels adjusted by guess.

Does the above seem reasonable? There is no question about the need for correct analyses. It is known that economy in plating, avoiding stream pollution and keeping rejects low are all important. These are all directly related to solution level control.

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*Presented at the 42nd Annual AES Convention, Cleveland, Ohio. The discussion following the presentation is not included here, but will be found in the "Annual Proceedings of the AES, 1955."

†A committee of the Indianapolis Branch of the American Electroplaters' Society.

BY JOHN W. HOLLAND,
LOREN STEVENS
and NELLO ARTERBURN†

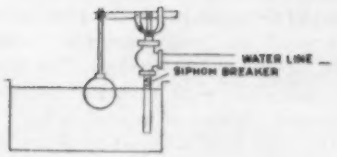


Figure 1
Gravity feed with air lock

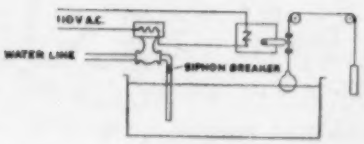


Figure 2
Direct operating float valve

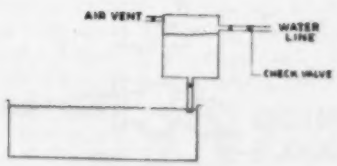


Figure 3
Float switch

METHODS

Liquid level control can be obtained in different ways; such as, manual control, float valves and floatless electrical systems. In order to select the right type of solution level control for a specific application, the accuracy, the safety and the cost of equipment must be considered. The allowed solution level differential for the plating tank would determine the accuracy of the needed control. The safety and cost of control equipment should be balanced against the value of the solution to be controlled. The amount of maintenance required to keep a unit in perfect operation is very important. The volume and temperature of the solution should have some influence on the type of control used. Regardless of the method of control used, all water connections to any plating department should be equipped with check valves, siphon breakers or other means of preventing the accidental back siphoning of plating solutions into the water system.

The most simple mode of control is to have the tank operator regulate the level of the solution. This method of control is not practical on large installations or, if the temperature of the solution is high enough, to make evaporation a problem. Manual control furnishes no level control when the tank operator is off duty. The safety of manual control is no better than the tank operator who controls the level. How many platers are there, who have never let a tank overflow? When manual control is used, it is important to keep the employees informed concerning the cost and the poisonous nature of some plating solutions. This procedure will help to produce more conscientious tank operators.

Gravity feed with air lock, shown in Fig. 1, will give adequate liquid level control for small installations. This method employs an air-tight storage container or bottle, located above the level of the solution to be controlled. A tube or pipe leads from the storage bottle and is secured at the point where the solution level is to be maintained. The solution will flow from the storage bottle until the solution level rises above the tube opening and stops the flow of air into the storage bottle. The limiting factor with this type of level control is the volume of the storage bottle.

The element of human error can be eliminated by the use of float valves, such as Fig. 2. The float valve gives continuous liquid level control and will be reliable if serviced periodically. The valve seat is the weak feature of the direct acting float valve. In a normal plating tank only a small amount of water is used. If a direct acting float valve is installed on one of these tanks, the valve has no on or off, but tends to flow at a slow rate all the time. Through this flow or leaking, the valve seat is eroded and reaches the point where it never shuts off completely. This is usually found after the tank has overflowed and there has been a loss of several gallons of solution. An improvement in float valves at a higher cost can be obtained from the float switch type regulator, as shown in Fig. 3. A switch is operated by a float to activate a solenoid valve or pump for filling of the plating tank. With this type regulator the solution level differential can be adjusted as desired and the wearing of the valve seat is not as great as in the direct acting type valve. The float switch has many possibilities and can be used for warning systems. Its chief limitations are corrosion of moving parts; however, with adequate maintenance satisfactory operation may be obtained.

Of all the solution level controls, the electrical controls will give the most dependable service with the least amount

of attention. One type of electrical control employs a B/W induction relay, shown in Fig. 4. This relay is operated by electrodes suspended in the plating bath. The relay may be located any distance from the electrodes and is housed in a standard sheet metal enclosure. The alternating current relay of 120 volts, can be used to start pumps or operate solenoid valves. This makes it possible to use these units for pump up or pump down control.

Carbon electrodes are used in the nickel and chromium baths, while monel electrodes are used in the cleaning tanks. The electrodes are threaded to fit stainless studs which are mounted in durable plastic, making a noncorrosive electrode holder (Fig. 5). A heavy rubber cup covers the terminals of the electrode holder, making possible a waterproof connection. Since the electrode circuit current is induced within the relay and has no direct connection with the power source, the relays are purchased with the solution conductivity specified. Alternate current is used on the electrodes to prevent electrolysis of the controlled solution. The flow of current in the electrode circuit is very small, ordinarily never more than 30 or 40 milliamperes.

The minimum liquid level differential of the control is ¼ of an inch, in still tanks. Where the system is to be used in a surging tank, the electrodes may be installed within a short piece of pipe to minimize the surging at the electrodes. To eliminate the surging of the solution created during the filling operation the water filling line should be located at least one foot from the electrodes. Following this practice will eliminate undue oscillation of the control mechanism.

A typical installation for simple solution level control is shown in Fig. 6. One B/W induction relay, two electrodes, an electrode holder, and a solenoid valve comprise the needed equipment. The cleaner tank is not insulated and the ground may be made directly to the metal tank.

Figure 7 is a wiring diagram of a control system which can be used on nickel and chromium tanks. The complete unit requires two B/W induction relays per tank, one functioning as level control and the other as high level warning. Four electrodes are mounted on the tank. Since these tanks are insulated, the longest electrode, No. 1, serves as the ground. No. 2 electrode is the low level control, which opens a ½-inch solenoid valve when the solution drops below this

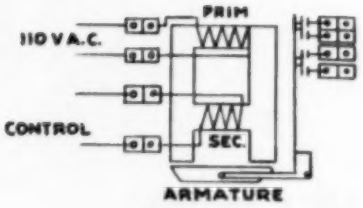


Figure 4
Induction Relay

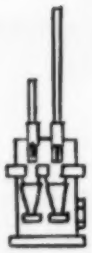


Figure 5
Electrode Assembly

electrode. The use of a ½-inch valve holds turbulence of the solution to a minimum during the filling operation. The slow filling rate of the small valve, also gives plant personnel ample time to reach the tanks before the overflow point is reached, if the high level warning rings. The valve is a normally closed valve which must be current activated to open. This provides safety in case of current failure. The No. 3 electrode is the high level stop, which closes the solenoid valve when the solution touches this electrode. The shortest electrode, No. 4, functions as the high level warning. If the solution contacts the high warning electrode, it activates one of the B/W relays with two normally open contacts. One contact controls a signal light at the tank. The other contact energizes a double pole relay, which is wired in parallel with all high level controls to give warnings in the department, gate house, and boiler room. A light in the gate house is wired to the normally closed side of the relay so it burns all the time if solution levels are not high, but goes out in case of high level or current failure. This gives assurance that a dead bulb cannot fail when depended upon for a warning. The normally open side of the relay operates a

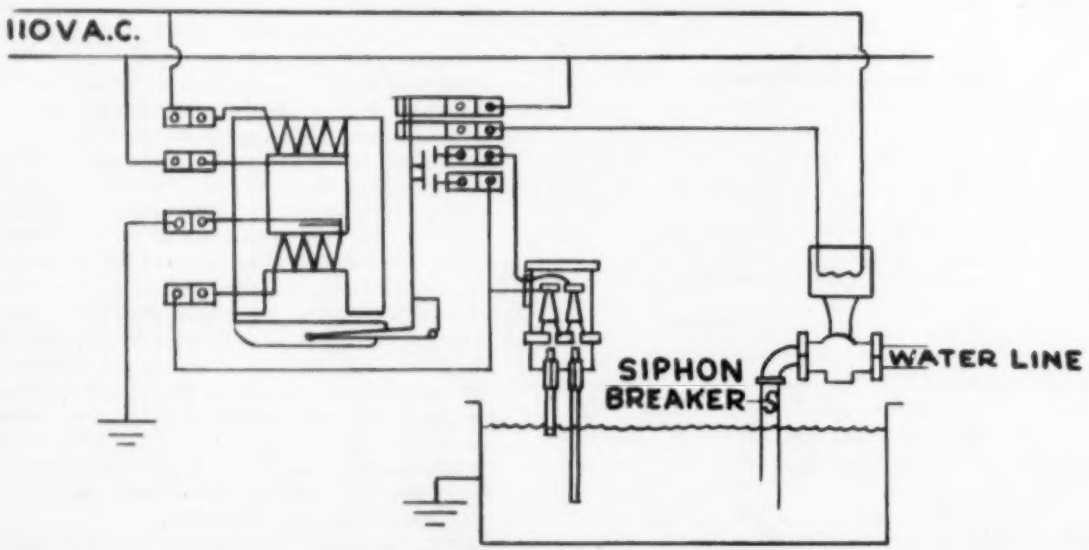


Figure 6 Level Control

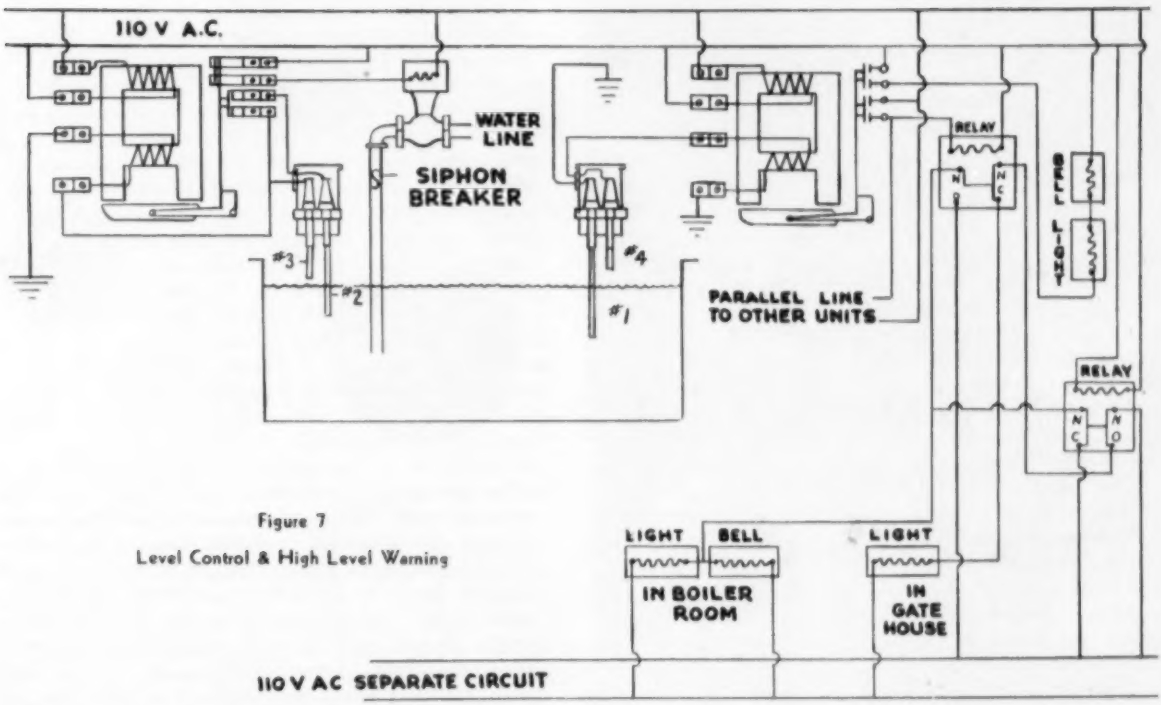


Figure 7

Level Control & High Level Warning

bell in the plating department and boiler room, giving an audible signal of high solution level. Another double pole relay with the current source coming from the plating department, works in conjunction with the above warning system, to give an alarm, if the current should go off in the department. The normally open contact is in series with the light in the gate house. The other normally closed contact is paralleled with the boiler room signal so the boiler room is notified the minute the current goes off in the plating department. This has an advantage in getting the heat exchangers restarted in case of current interruption.

The control system explained above has been in service for over a year. The maintenance has been very small and has consisted only of replacing carbon electrodes, which have been broken by carelessness. Replacement of electrodes requires only a few minutes. A solenoid valve failed to close at one time and the failure was traced to a flake of rust under the valve seat. This can be eliminated by use of a strainer ahead of the solenoid. When using the electrodes in solutions with high salt concentration, such as a nickel bath, in which salts will tend to crystallize, the crystals should be removed from the electrodes periodically. Failure to remove this crystalline growth may short out the control.

CONCLUSION

It is well to note that there are other floatless controls which can be used as the equipment discussed in this article. The authors have only mentioned the type relay used to simplify the wiring diagram, showing the warning system that has been incorporated with the solution level control system. It has been with the assistance of Robert Harden, Production Engineer at Arvin Industries' Electrical Appliance Division, that the work on floatless controls is presented.

In conclusion, there never will be a substitute for a good dependable plater; the plater's load can be lightened, however, by education, mechanization and better equipment.

Solution level is important and the operation is no better than the control. However it is accomplished, one should give the analyst and the entire operation consideration and see that all solution levels are maintained accurately.

J. W. HOLLAND

John W. Holland received his AB in chemistry from Indiana University in 1941 and soon thereafter started his plating experience in the bearing division of the Allison Division of General Motors, Indianapolis, Ind. Since 1946, he has been employed by Arvin Industries, Inc., Columbus, Ind., first as plating chemist, then production foreman, and now chief chemical engineer, working with various phases of metal finishing.

Holland

L. D. STEVENS

Loren D. Stevens received his BS degree in chemistry from Indiana University in 1951. Prior to this he served two years in the U. S. Navy. His first industrial position was with the Advance Paint Company in Indianapolis. In 1953, he was employed by Arvin Industries, Inc., Columbus, Ind., as a chemist in their plating laboratory.

Stevens

N. R. ARTERBURN

Nello R. Arterburn, entered the plating field in 1946 with Evans Plating Service, Columbus, Ind. After serving 3½ years in the Paratroops of the Armed Forces, he was employed at Hamilton Mfg. Corp. as lab technician in 1947 where he is presently serving as plating superintendent.

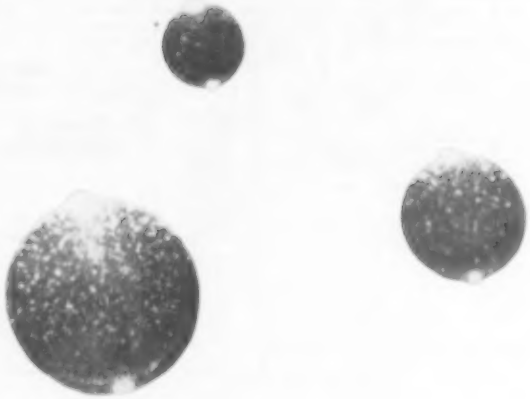
Arterburn

THE TREATMENT OF CERTAIN PLATING SOLUTIONS BY ION EXCHANGE

EDWARD B. TOOPER*

ABSTRACT

Solutions used in various electroplating operations are expensive, toxic, sensitive to impurities and difficult to dispose of. In many cases ion exchange resins can be used to purify and recover chemicals such as chromic acid. Disposal of toxic wastes can be alleviated by proper use of ion exchange. Such treatments are both practical and economical.



The plating industry uses a wide variety of chemical solutions which must be maintained within certain quality limits to provide satisfactory plating at maximum production rates and minimum cost. From an economic viewpoint, solutions should be purified and recovered since they are expensive and require close maintenence of quality for best results. A wide variety, both in concentration and type of baths are utilized. These include alkaline cyanide plating baths, chrome plating, anodizing and stripping baths and copper plating baths. The constituents of the solutions are all toxic to a high degree and from a public health standpoint should not be discharged to the sewer system. Water which is used to make up these solutions and that which is used for rinsing should be considered as being borrowed since eventually it must be returned. In common with other borrowed articles it should be returned in the best possible condition. The use of ion exchange resins offers a convenient and economic solution to many of the platers' purification and disposal problems.

Ion exchange is both simple and complex. The concept of ion exchange is beautifully simple in common with many great inventions but complex insofar as a choice of proper resins, handling techniques and engineering design are concerned. The operation of an ion exchange unit is simple as evidenced by the thousands of domestic water softeners in daily use in the home. To understand the concept of ion exchange it is convenient to draw analogies between ion exchange and a common precipitation reaction. For example, a solution of silver nitrate when mixed with common table salt forms a precipitate of silver chloride and sodium nitrate remains as a soluble substance. The chemical equation for this reaction is written as follows:

$$AgNO_3 + NaCl \rightleftharpoons AgCl + NaNO_3$$

It can be considered that the silver has exchanged or swapped for the sodium in the sodium chloride molecule to form the insoluble silver chloride. Actually, salts such as sodium chloride and silver nitrate separate into discrete charged entities called ions. Metals such as silver and sodium usually form positively charged ions which are called cations. Ions such as nitrate and chloride are charged negatively and are called anions. Thus, silver ion has exchanged for the sodium ion in sodium chloride to form silver chloride and sodium nitrate. This reaction could be called ion exchange since ions are exchanged or swapped in the process.

*Special Projects, Ion Exchange Div., National Aluminate Corp., Chicago, Ill.

Ion exchange resins are specially prepared materials which have the property of exchanging or swapping ions in a manner similar to the above. Through a proper choice of the type of resin or plastic which is used and the control of the type ion active group it is possible to make resins which will exchange either cations or anions. Ion exchange resins which exchange cations are called cation exchange resins while anion exchange resins exchange anions. The difference between ion exchange resins and the salts which were described in the above example is that the salts are soluble while the resins can be called semi-soluble. In the case of a cation exchange resin the anionic portion is fixed to the resin and does not dissolve in water or other solvents. To preserve electroneutrality there must be a cation associated with each anionic group. The cations are mobile and may exchange with other cations which are present in the surrounding solution. Since the anions are fixed to the resin they are not exchangeable. Conversely, in an anion exchanger the cationic groups are fixed to the resin while the anionic groups are mobile and free to exchange with other anions in the surrounding solution.

Cation exchangers can be employed in a wide variety of forms. By washing a cation exchanger with a dilute solution of a mineral acid the various cations which may be present in the resin are replaced by hydrogen ion and the resin is said to be in the hydrogen ion form. Similarly, the resin can be put in the sodium form by washing with a dilute solution of sodium chloride, sodium sulfate or other sodium salts. A resin in a given form will exchange its ions for all other ions which contact it. For example, a cation resin in the hydrogen ion form, if contacted with a solution of sodium chloride, will exchange the sodium ions for hydrogen ion and hydrochloric acid will be formed in solution. The reaction can be written as follows:

$$R\text{-}H^{+} + NaCl \rightleftharpoons R\text{-}Na^{+} + HCl$$

Similarly anion exchange resins can be placed in various anionic forms by washing with an appropriate solution. Most commonly, an anion exchange resin is employed in the hydroxide form. To convert to the hydroxide form it is necessary to wash the resin with a solution of sodium hydroxide. Such a resin in the hydroxide form if contacted with a solution of sodium chloride will form an equivalent amount of sodium hydroxide.

$$R\text{-}OH^{-} + NaCl \quad R\text{-}Cl^{-} + NaOH$$

Similarly, if contacted with a solution of hydrochloric acid the chloride will exchange for hydroxide and water will be formed.

$$R\text{-}OH^{-} + HCl \rightleftharpoons R\text{-}Cl^{-} + H_2O$$

The process of treating a solution by hydrogen cycle cation exchange followed by hydroxide cycle anion exchange results in the removal of all salts from the solution. Such a process is termed deionization. These principles can be used to illustrate various treatments and processes which are useful to the plater.

ANODIZING SOLUTIONS

Of the strong chromium containing solutions anodizing baths are easiest to treat and handle by ion exchange. At a concentration of 5-10 per cent, spent chromic acid can be purified directly by hydrogen cycle cation exchange to remove aluminum and chromic ions.[1] An equivalent amount of hydrogen ion is released so that pure chromic acid is formed from the aluminum and chromic chromates. Hydrogen ion which is present as chromic acid is not affected by the treatment and passes through the ion exchange unit unchanged. When the resin becomes saturated with aluminum and chromic ions it must be regenerated by washing with a solution of sulfuric acid. This treatment reconverts the resin to the hydrogen ion form and the aluminum and chrome are sent to waste as the sulfates. Prior to the development of the ion exchange process it was necessary to draw off and discard spent solutions and to make up the volume with pure chromic acid. This is a very wasteful procedure since much usable hexavalent chrome is lost. In addition, waste disposal measures should be employed to eliminate dumping of this toxic waste to the sewer. This cost plus the cost of replacement chromic acid is high. By way of contrast, the ion exchange method permits reuse of all of the hexavalent chrome. None is discarded. Regeneration is with a cheap chemical—sulfuric acid. By regulating the amount of treatment it is possible to maintain constant conditions in the anodizing bath with a consequent improvement in anodize coat quality. It has been shown that there is a very definite advantage in operating a 10 per cent bath at about a pH of 0.85 and a 5 per cent bath slightly higher. The control of the pH and metallic content in the bath can be easily effected by proper use of ion exchange materials and at a greatly reduced cost over the old dumping technique. In addition, the waste disposal problem is greatly reduced.

CHROMIUM PLATING SOLUTIONS

More concentrated solutions such as are found in chrome plating and chrome stripping baths are ordinarily diluted to approximately 100-120 g/l prior to cation exchange. This has been necessary since it has been felt that above this concentration an excessive amount of resin oxidation occurs.[1] After hydrogen cycle cation exchange treatment to remove Cr^{+3}, Fe, Ni, etc. the solution is concentrated in a glass lined evaporator to the desired degree. The costs for an evaporator and associated equipment plus the expense of operation has held up development of this process despite the fact that there are many significant advantages to be gained. Cation exchange treatment is quite specific in that it removes only metallic cations and substitutes an equivalent amount of hydrogen ion. The chromate and sulfate ions are not affected except that some dilution may occur. As the metallic impurities are removed and the salts converted to chromic acid the conductivity of the solution increases considerably permitting maintenance of the proper amperage at a much lower voltage. Thus, power costs are decreased. It has been reported that the quality of the work is improved and the number of rejections greatly reduced after installation of such a cation treatment. It is interesting to note that the advantages enumerated are obtained from the process even though such installations are usually made to alleviate disposal of spent plating solutions. The best known example of such an installation is that reported by Gilbert[2] in which all of the above advantages were attained. It was further shown that the equipment would pay for itself within 4 years operation. The cost calculations did not take into consideration the savings resulting from reduced power requirements for the plating and anodizing operation, reduced plating rejection rate nor the cost of disposal if some other treatment such as reduction of the chromate with sulfite were employed as an alternate solution to the problem.

A recently announced heavy duty resin,* has a useful life

*Nalcite HDR or its equivalent.

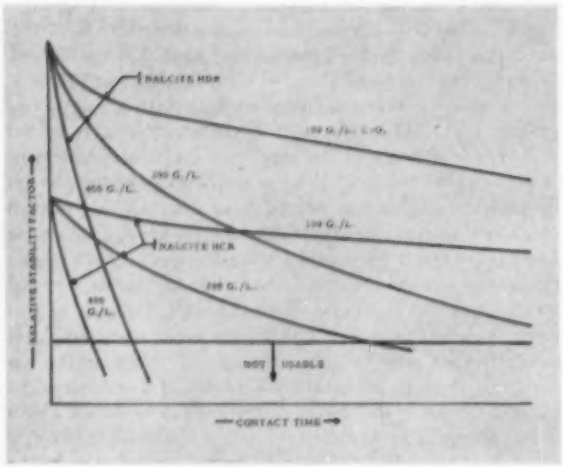


Figure 1. The Stability of Nalcite HCR and Nalcite HDR to Chromic Acid Solutions

under oxidizing conditions which is about twice as long as previously available sulfonated polystyrene cation exchangers. Figure 1 is a plot of the relative stability of the two materials in chromic acid solutions from 100 g/l to 400 g/l. From these and other data it is anticipated that chromium plating solutions to a concentration of 250 g/l CrO_3 may now economically be treated by hydrogen cycle cation exchange without the necessity of prior dilution. By using direct cation exchange the bath can be closely controlled so as to maintain contamination and solution resistance at a low and constant level. This purification system may make it possible to plate at concentrations lower than 400 g/l. It should also be noticed that operation at 250 g/l would result in considerably less chromium dragout than at 400 g/l.

It should be clearly recognized that ion exchange resins, regardless of their application, do degrade both physically and chemically. The rate of degradation is variable with the type of process. In ordinary water softening, resin loss is ordinarily held to less than 5 per cent per year. In treating chromic acid solutions of approximately 400 g/l the resin may be degraded completely after a total contact time of only a few days. However, the cost of the recovered solution is such that it may be quite feasible to replace the resin at periodic intervals rather than to provide for evaporation. Even a useful resin life of a few days will allow for a large number of cycles since, at this concentration, an exhaustion cycle may take only an hour or two at the most. Thus, one contact day would permit some 10-20 cycles to be run.

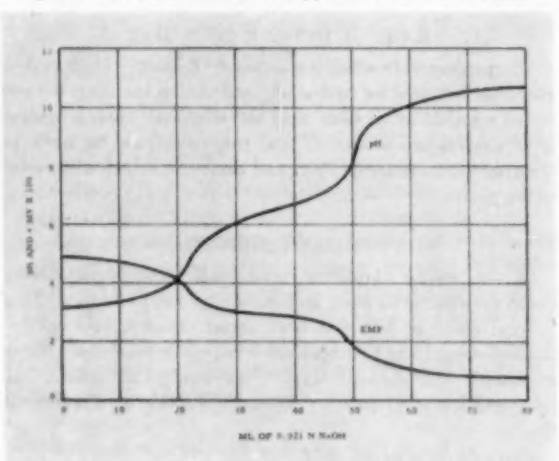
STILL RINSE SOLUTIONS

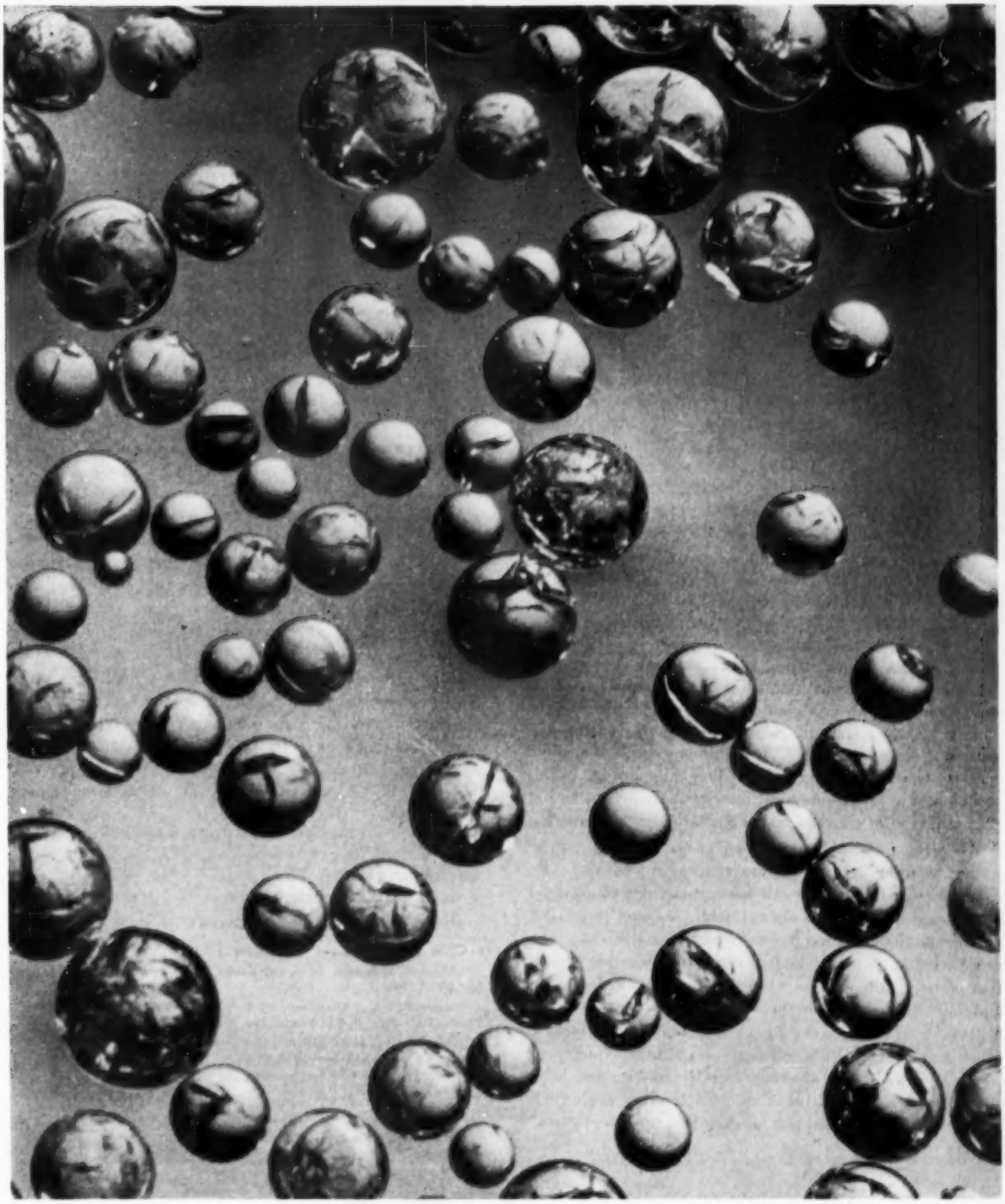
Treatment of the plating baths is necessary only when dragout from the baths does not keep the contamination at a satisfactory level. For example, decorative chrome baths have a very high dragout rate and it is estimated that about 85 per cent of the chromate is ordinarily lost to the sewer. In order to conserve chrome and to minimize waste disposal it is feasible to employ one or more still rinses. The chromic acid content is allowed to build up to approximately 4 oz/gal of CrO_3 and is returned to the plating tank whenever possible as permitted by evaporation and dragout losses. Evaporation of the still rinse is often necessary in order that excess water not be introduced into the system. It is sometimes found that if chromium is conserved in this manner cationic contamination will build up to the point where a portion of the bath must be discarded or cation exchange treatment inaugurated. If a plant has a two bed (cation exchanger and an anion exchanger) deionizer available it is often a simple matter to run this rinse solution through the cation exchanger prior to evaporation. This way, contamination can be kept at a satisfactory level.

RUNNING RINSE SOLUTIONS

Of extensive current interest to platers is the complete deionization of rinse solutions. This may take a form of deionization of raw water or of deionization of chromium containing solutions used in a closed cycle rinse system. Use of a closed cycle system often results in lower total dissolved solids which is cheaper to deionize than raw water. Also, waste disposal is almost completely alleviated. Deionization of raw water falls in the realm of ordinary water treatment and requires no further comment here. Treatment of closed cycle rinse systems are somewhat different and because of a general lack of published information deserve additional consideration. In general, the process involves treatment with both the hydroxide form of a strong base anion exchange resin and the hydrogen form of a cation exchange resin. Weakly basic anion exchange resins are not applicable since leakage may be high and regeneration difficult from a practical viewpoint. Two quaternary ammonium or strong base resins types are useful. These are type I (Nalcite SBR) and type II (Nalcite SAR). There are three processes which are available each having definite advantages and disadvantages. Exhaustion of the deionizer can be with the rinse solution as received from the system. This solution is generally acidic since it consists predominantly of chromic acid. Deionization would be effected by hydrogen cycle cation exchange followed by hydroxide cycle anion exchange. A second system would involve neutralization of the rinse solution with caustic soda to approximately pH 4.5-5.0. Under these conditions the chromic acid is half neutralized. It could also be said that this is a half-acid system. After partial neutralization the solution is treated first by the anion exchange resin followed by the cation exchange resin in a reverse deionization proce-

Figure 2. Titration Curves of 500 ppm Chromic Acid Solution





Close-up of Nalcite SBR Heavy-Duty Resin

dure. The third system would involve full neutralization to pH 8.5-9.0 followed by reverse deionization. The purpose of neutralization is to reduce the oxidation potential of the solution. This is shown in Figure 2. In order to make a proper choice of the best possible anion exchange resin and process to be used several things must be considered. These are (1) capacity, (2) chemical stability, (3) physical stability and (4) equipment and operating costs. A detailed consideration of all of these factors is beyond the scope of this paper and it is usually best for the user to rely on the judgement of reliable equipment manufacturers since factors other than resin choice are involved. However, the following can be used as a guide:

1. Type II resins show a higher operating capacity than type I. But type I have better chemical stability.
2. The acid system has the highest operating capacity

followed by the half acid and the fully neutralized system.

3. Chemical stability is highest for the full neutralized system followed by the half acid and the acid system.
4. Physical stability is highest for the fully neutralized system.
5. Physical stability is increased by reducing the regenerant level.

The above indicates that in a closed cycle deionization system where the total dissolved solids are low, the acid system using Nalcite SBR will probably be the most satisfactory. Equipment costs are at a minimum, cycles are long so that bead breakage is not excessive, chemical stability is good as verified by actual plant operation and operation is simple. To obtain greater resin life, particularly where dissolved solids are higher, it is suggested that serious consideration be given to either partial or full neutralization. While these systems will result in somewhat lower operating capacities requiring larger equipment and additional equipment for the neutralization step, resin life is definitely increased. Both physical and chemical stabilities are better. In larger plants which operate continuously and many cycles are expected from the equipment these additional safety features may reduce resin replacement costs significantly.

The spent caustic anion exchanger regenerant contains sodium chromate plus excess sodium hydroxide. It can be converted to usuable chromic acid by hydrogen cycle cation exchange. Much has been written about the economics of this conversion to chromic acid. It has been generally recognized that such a step is, at best, a break-even proposition. It should be noted that these cost estimates have been based on straight regeneration with no caustic recycle. Proper recycle results in considerably higher caustic conversion to sodium chromate. In addition, sizing of the cation unit can be substantially reduced. Proper application of this technique can reduce chemical costs to a third to a half of that required for conventional regeneration without recycle.

While this problem appears complex the advantages to be gained by using deionization are well worth the effort. By using deionized water the salt spray resistance of anodized coats may be increased several fold. In one decorative chrome plating operation it was found that use of either raw or softened water for the final rinsing step resulted in deposition of hard salt deposits which had to be buffed off. In addition, it was necessary to wipe each piece with a damp cloth prior to buffing since the buffing step would otherwise cause scratching. Installation of deionization equipment resulted in elimination of nearly all of the buffing and hand wiping requirements. This is an example of an application where the equipment will pay for itself in a very short period of time.

CYANIDE SOLUTIONS

From a waste disposal viewpoint the treatment of cyanide containing solutions is considerably more of a problem than chromates. A few papers on this subject have been published but the ion exchange method has not received general acceptance as yet. Treatment of the plating solutions is apparently not feasible. However, large volumes of rinse water are used and can be handled somewhat more easily. In general the method involves deionization of the rinse water using a two bed deionizer consisting of a cation exchanger in the hydrogen form followed by an anion exchanger in the hydroxide form.[4] The low pH generated in the cation unit causes dissociation of most of the cyanide complexes into metallic cations which are picked up by the cation exchanger and hydrogen cyanide which is carried through to and picked up by the anion exchange resin. Regeneration of the cation resin with sulfuric acid results in the accumulation of the metal as a sulfate salt. Regeneration of the anion unit results in the recovery of cyanide as a mixture of sodium cyanide in a caustic soda solution. By utilizing recycle good caustic utilization can be realized. In the process, deionized water is produced which makes a superior rinse. The handling of the spent regenerants, is somewhat difficult. A number of methods have been proposed such as acidification of the caustic regenerant followed by volatilization of the hydrogen cyanide which can either be vented to a stack or converted to sodium cyanide in a caustic scrubber. Another method which has been considered is the batch oxidation of the free cyanide with hypochlorite. This process can easily be carried out in the regenerant retention tank since the solution is concentrated and always has an excess of caustic present. Another procedure which has been considered may be useful where the metal is amphoteric. In this process the anion exchange resin is regenerated with caustic soda and the effluent is passed through the cation unit. Cations are replaced by sodium ion and recovered from the cation effluent as an anion. This procedure may be of value for such solutions as zinc. A still different approach is to treat the rinse solution by hydrogen cycle cation exchange followed by degasification to remove hydrogen cyanide and anion exchange for final clean up to produce deionized water.[5] The hydrogen cyanide may be absorbed in a caustic soda solution. A considerable amount of work is being done on the problem of treatment of cyanide containing solutions and it is believed that several practical systems will be evolved which will satisfactorily handle this problem.

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[6]Walker, C. A. and Zabban, W., Plating 40, 269 (1953).

Grateful acknowledgement is given to W. Henning and B. Joyce who performed some of the work which is reported in this paper

Tooper

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Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

No. 2,708,304, May 17, 1955—Aluminum Coated Articles—H. Lundin, North Bergen, N. J.

Aluminum coated ferrous articles, characterized in that the aluminum is bonded to the ferrous base by an intermediate intermetallic layer of 35 per cent to 65 per cent each of iron and aluminum and from 0.2 per cent to 2.5 per cent of zirconium or titanium. The zirconium and titanium are present as the result of the flux used—see U. S. patent No. 2,686,355.

10 claims.

—AES—

No. 2,708,445, May 17, 1955—Wire Processing Apparatus—W. Manson & H. Kenmore, assignors to National Standard Company, Michigan.

An apparatus is described for plating heavy wire. An improvement over U. S. patent No. 2,495,695.

2 claims, 6 figures.

—AES—

No. 2,709,010, May 24, 1955—Control System for Electroplating and Like Machines—Guerin Todd, assignor to Hanson-Van Winkle-Munning Co., Matawan, N. J.

A conveyor mechanism is described whereby it is possible to selectively position work pieces. A cam driven with the conveyor closes normally opened switches in succession as the conveyor moves into its stopped positions and a cam connected with the cam driven with the elevator for engaging and opening said normally opened switches in succession whereby the movement of the conveyor is varied in accordance with the ones of the normally ineffective pickup means which have been made effective.

6 claims, figure.

—AES—

No. 2,709,142, May 24, 1955—Cleaning Metal Strip—G. Durst, assignor to Metals & Controls Corporation, Attleboro, Mass.

A method of cleaning the surface of a metal strip preliminary to solid phase bonding thereof with another metal strip is described. This is done by feeding the strip over the periphery of a rotating scratch brush. The speed of the brush and strip and the penetration of the brush being such as to frictionally heat the strip sufficiently high to drive off contaminants such as organic matter, moisture, etc.

4 claims, figure.

—AES—

No. 2,709,143, May 24, 1955—Method and Apparatus for Pickling and for Recovering Spent Acid Solutions—C. Frances and E. Lynch, assignors to U. S. Steel Corp.

The method involves the removal of spent acid from the entry end of the pickling line, cooling to 110° F by blowing ambient air into the solution, then expanding compressed air at −100° F into a chamber containing the partially cooled solution to reduce the temperature to 20° F. The salt crystals are then crystallized from the solution and the solution heated by exposing it to the compressed air prior to its expansion into the chamber. The acid solution is then returned to the opposite end of the pickling line.

14 claims, figure.

No. 2,709,154, May 24, 1955—Corrosion Resistant Coatings—F. J. Hansgrig, assignor to American Electro Metal Corporation, Maryland.

A method is described for protecting molybdenum, tungsten, and alloys of these metals from corrosion by coating with aluminum to form a dense oxygen-impervious intermetallic compound layer between the base metal and the aluminum after which the free aluminum is removed. The aluminum deposition is done in a molten electrolyte of aluminum compounds at 900 to 100° C using a high current density electric current with the article the cathode.

2 claims, figure.

—AES—

No. 2,709,516, May 31, 1955—Drawing Compound and Method—H. Trembicki, Chicago.

Lubrication of ferrous rod or wire for drawing is done by immersing said rod or wire in an aqueous bath containing an alkali metal borate in solution and titanium dioxide in suspension, removing and drying. The article is then coated with a uniformly dispersed solid mixture of alkali metal borate and titanium dioxide.

6 claims.

—AES—

No. 2,709,666, May 31, 1955—Method of Removing the Insulation Layer of Enamelled Wire—B. W. Speckman, assignor to Hartford National Bank and Trust Co., Hartford, Conn.

The removal of synthetic enamel lacquer is accomplished by immersing the wire in a bath of an aromatic sulfonic acid heated at least to 200° C after which the carbonized layer is wiped off.

4 claims.

—AES—

No. 2,710,253, June 7, 1955—Semiconducting Alloy—R. K. Willardson et al., assignors to Battelle Development Corp., Columbus, Ohio.

A semiconducting material, consisting of 33.5 per cent to 0.93 per cent by weight of gallium, from 1.44 per cent to 17.65 per cent of aluminum and the balance antimony, is described. The sum of the weight percentage of gallium and 2.01 times the weight percentage of aluminum is equal to 36.4.

9 claims, figure.

—AES—

No. 2,710,271, June 7, 1955—Process for Annealing and Cleaning Oxidized Metal in a Salt Bath—E. B. Farnsler and H. E. Tschop, assignors to International Nickel Co., Inc., New York, N. Y.

This annealing and cleaning process refers to an alloy characterized by a refractory oxide coating, predominantly the oxide of a metal of atomic number from 24 to 29. The oxidized article is immersed in a salt bath of 20 to 80 per cent sodium fluoride, ballance sodium carbonate, for at least two minutes at a temperature of 1500° to 2000° F.

4 claims.

—AES—

No. 2,710,272, June 7, 1955—Tin Pot Oil Composition—W. O. Cook, assignor to the United States Steel Corporation.

The oil consists mostly of a mineral oil with a flash point greater than 500° F; at least 5 per cent by weight of a fatty oil; selected from palm, castor, hydrogenated corn, cotton seed, coconut, fish oil and tallow; and at least 0.25 per cent by weight of stannous chloride.

3 claims.

—AES—

No. 2,710,832, June 14, 1955—Electroplating of Iron—R. E. Harr, assignor to Western Electric Co., Inc., New York, N. Y.

The bath comprises an aqueous acid solution of ferrous ammonium sulfate (40 oz/gal) to which is added a small amount of ammonium fluoborate (2.4 oz/gal). Temperature given as 140° F–150° F and the pH as 4.9–5.5.

13 claims, 1 figure.

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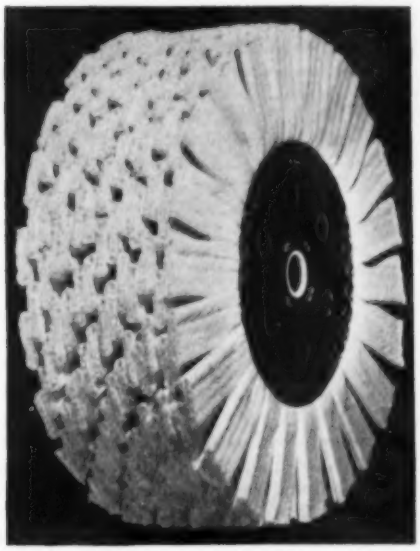

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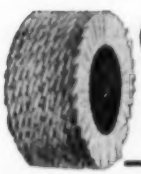

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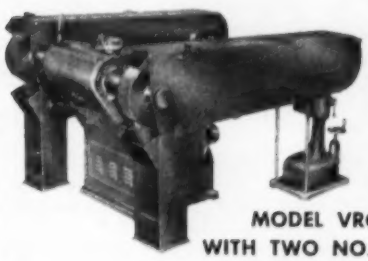
Turn the conveniently located dial and get spindle speed changes from 1500 to 3000 RPM instantly, while lathe is in operation. Model VROL Variable Speed, Ball Bearing, Polishing and Buffing Lathe with a spindle overhang of 8" permits handling of bulky parts without base interference.



Model VRO Variable Speed Polishing Lathe converted into a high production Abrasive Belt Unit by means of two Model 3-R Backstands. Faster, cooler cutting, increased production, more uniform finish are obtained through the use of abrasive belts.

MODEL VRO VARIABLE SPEED
WITH TWO NO. 3-R BACKSTANDS

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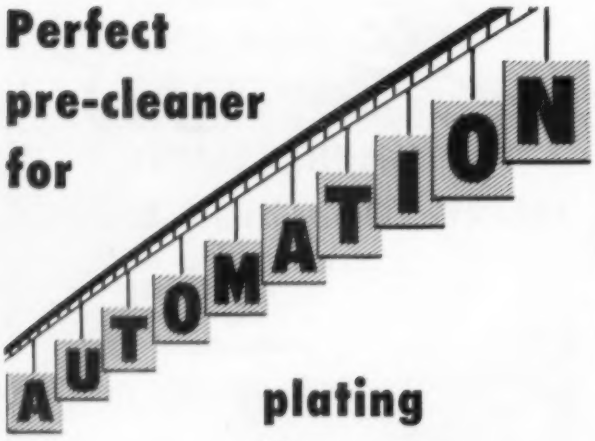

plating lines...

DIVERSEY 909... the unique non-caustic cleaning compound that has exceptionally powerful cleaning action is "made to order" for automatic set-ups. Fast wetting and rapid emulsifying action knocks out dirt and contamination that slows down production. Diversey 909 cleans quickly, completely and safely . . . makes one pre-cleaning do the work of two by eliminating solvent presoak in most cases. So to get *full speed ahead* from your automatic plating equipment . . . preclean with Diversey 909! For more information or an on-the-spot demonstration, write us on your letterhead.

THE DIVERSEY CORPORATION

1820 Roscoe Street, Chicago 13, Illinois

In Canada: The Diversey Corporation Canada Ltd., Port Credit, Ont.

PATENT ABSTRACTS

—AES—

No. 2,710,502, June 14, 1955—Method of Buffing Steel—G. A. Lyon, Detroit, Mich.

The method refers specifically to wrought stainless steel and involves a pretreatment wherein the article is immersed in a liquid medium at 1200–1300° F for ½–1½ minutes, quenched, then buffed. The disclosure describes the medium as the eutectic of NaCl, $BaCl_2$ and KCl. Claim 7 describes spraying article before cooling with a buffing compound containing a fusible salt, then buffing.

8 claims.

—AES—

No. 2,710,792, June 14, 1955—Composition and Process for Treating Aluminum and Aluminum Alloys Preparatory to Spot Welding—Louis McDonald et al., assignors to Kelite Products, Inc., Los Angeles, Cal.

The composition covered broadly contains phosphoric acid (11¼–26¼ per cent), a sequestering agent (½–10 per cent), and an aryl sulfonic acid (2½–12½ per cent). The use of ammonia is also claimed. The aryl sulfonic acid limited to one with less than 7 alkyl carbon atoms. The preferred composition is made up as follows:

7.9% citric acid
7.1% 28° Be ammonia
10% Xylene sulfonic acid
37½% phosphoric acid
37½% water

and diluted with an equal weight of water in practice.

10 claims.

—AES—

No. 2,711,973, June 28, 1955—Vapor Phase Coating of Molybdenum Articles—E. Wainer and R. Kempe, assignors to Thompson Products, Inc., Cleveland, Ohio.

Molybdenum articles are made corrosion and heat resistant by subjecting to stream of silicon tetrafluoride and hydrogen at 1600–1800° F for two hours. Intermetallic silicon-molybdenum compounds, formed at surface of the article are protective.

7 claims, figure.

—AES—

No. 2,711,974, June 28, 1955—Coating for Metals—A. Hoppe, Detroit, Mich.

This coating is formed by heating a thin layer of aqueous sodium silicate (50 per cent by weight) containing:

Cobalt oxide	15% by wt.
Nickel oxide	15% by wt.
Vermiculite	10% by wt.
Kaolin	10% by wt.

to 750°–800° F.

3 claims.

—AES—

No. 2,711,993, June 28, 1955—Apparatus for Conveying Cylindrical Articles Through a Bath—G. Lyon, Detroit, Mich.

A conveyor mechanism is described for moving cylindrical articles through a liquid processing bath. Electrical connections are provided.

7 claims, figure.

—AES—

No. 2,712,524, July 5, 1955—Electropolishing of Gold and Gold Alloys—M. Reichert, assignor to Deutsche Gold und Silber, Scheideanstalt, Frankfurt, Germany.

The process consists of electropolishing in an acid, aqueous bath containing at least 5 grams of thiourea per liter at 30°–100° C. Claim 6 mentions sulfuric acid and tartaric acid.

6 claims.

See also No. 2,712,525 assigned to same company on electropolishing gold alloys wherein ions less noble than gold, e.g., silver, are also present.

—AES—

No. 2,712,511, July 5, 1955—Method for Preparing Ferrous Metal for Forming—G. Orozco and R. Roy, assignors to Pennsylvania Salt Mfg. Co., Philadelphia.

A microporous film is laid down on the steel to be formed by treatment with an aqueous solution as follows:

Oxalic acid, zinc oxalate or phosphate and mixtures thereof	10–30 parts
Acid-soluble aliphatic polyhydric alcohol ester having less than 4 hydroxy groups of an inorganic acid	5–15 parts
Phosphoric acid (85 per cent)	5–15 parts
Hypophosphorous acid (50 per cent)	1 part

9 claims.

—AES—

No. 2,712,521, July 5, 1955—Process of Making Bismuth Resistance—J. Gaurdiola et al., assignors to Voltohm Processes, Ltd., Tangier, Morocco.

The process consists of electrolytically depositing a layer of bismuth on a conducting support, applying an insulating support over the bismuth plate, then dissolving at least partly the conductive support, leaving a bismuth resistance with an insulating support. Copper may be the conductive support or vacuum metallized surfaces which can be dissolved without dissolving the bismuth. The perchloric acid bismuth bath with a protective colloid is mentioned.

4 claims, 11 figures.

—AES—

No. 2,713,011, July 12, 1955—Method of Cleaning Metal Strips—G. Durst, assignor to Metals & Controls Corp., Attleboro, Mass.

A method for cleaning inwardly opposed faces of two continuous travelling strips by blowing clean gas between them.

6 claims, figure.

—AES—

No. 2,712,931, July 12, 1955—Apparatus for Recovering Silver—R. Maddock, assignor to Paho Corp., Minneapolis, Minn.

An apparatus for recovery of silver from photographic fixing solutions is described in which aluminum functions as the reducing material.

5 claims, 2 figures.

—AES—

No. 2,713,355, July 19, 1955—Electrolytic Refining of Antimony—John Nuly, San Francisco, Cal.

Stibnite is is leached with caustic soda and then the antimony is electrodeposited from this solution.

1 claim, figure.

PLATER

1—2500 amp., 12 volts, 1250 amp., 24 volts 600 RPM Generator to a 50 HP., 3 phase, 60 cycle, 440 volts (can be connected 220 volts) syn. motor with a direct connected exciter all manufactured by the Chandeysson Company.

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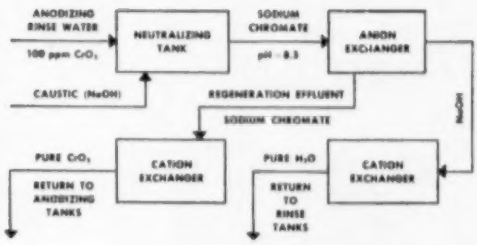

RECOVERY OF CHROMIC ACID FROM ANODIZING RINSE WATER

The block diagram above indicates one method of using ionXchange to save money, in the plating rooms of a large automobile plant, by recovering the chromic acid from the rinse tanks of anodizing operations. The cost of equipment was much less than the cost of a disposal plant, and the savings through recovery were substantial enough to make the investment a very profitable one.

REMOVAL OF ALUMINUM FROM ANODIZING BATH

A secondary purpose for one part of the same installation was the removal of aluminum from the anodizing baths. When the concentration of aluminum in any anodizing tank rose to nearly 1 g. per liter, that tank was cycled through the cation exchanger and the aluminum removed, thus saving over $250 a week compared with partial dumping. *For details on this and many other money-saving applications of ILLCO-WAY ionXchange, write us or consult your Illinois Water Treatment Company representative.*

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3712 National Highway West — Springfield, Ohio

ARTICLE REFERENCES

By
WILLIAM TUCKER

Most of the articles listed here may be obtained by writing to the publication. Addresses are included for the reader's convenience.

Eastman Kodak
Rochester, N. Y

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a. *SURFACE TREATMENT AND FINISHING OF LIGHT METALS. PART VII. INDUSTRIAL ANODIZING OF ALUMINUM AND ITS ALLOYS*
S. Wernick and R. Pinner
Metal Finishing, Vol. 53, No. 9, September 1955, p. 69–75

116. CLEANING

a. *METAL CLEANING COSTS*
ASM Committee on Cost of Metal Cleaning
Metal Progress, Vol. 68, No. 2A, August 15, 1955, p. 169–173

117. CORROSION

a. *ATMOSPHERIC GALVANIC COUPLE CORROSION*
K. G. Compton, A. Mendizza and W. W. Bradley
Corrosion, Vol. 11, No. 9, September 1955, p. 35–44

118. ELECTROLESS NICKEL

a. *NICKEL PLATING BY CHEMICAL REDUCTION*
W. S. Crehan
Product Engineering, Vol. 26, No. 7, July 1955, p. 148–152

119. INSTRUMENTATION

a. *INSTRUMENTATION IN ELECTROPLATING*
J. L. M. Fletcher
Metal Industry, V. 86, June 24, 1955, p. 533–537

120. NICKEL

a. *GALVANIC NICKEL DEPOSITS FROM CHLORIDE AND SULFATE SOLUTIONS (GERMAN)*
Ernst Raub
Metalloberflache, Ausgabe A, Vol. 9, No. 6, June 1955, p. 88–93

b. *ELECTRODEPOSITION OF NICKEL FROM FLUOBORATE SOLUTIONS*
C. B. F. Young and William Strobach
Metal Finishing, Vol. 53, No. 9, September 1955, p. 79–85

c. *BRIGHT NICKEL PLATING SOLUTIONS—THEIR CHOICE, CONTROL AND OPERATION*
T. E. Such
Electroplating and Metal Finishing, Vol. 8, No. 9, September 1955, p. 308–315

121. ORGANIC COATINGS

a. *EPOXY COATINGS PROTECT COPPER AND BRASS*
E. H. Christ
Organic Finishing, August 1955, p. 13–15

b. *ORGANIC FINISHES FOR CONCRETE FLOORS*
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Organic Finishing, September 1955, p. 13–16

122. ORGANIC FINISHING

a. *AIRLESS ATOMISATION IN SPRAY PAINTING*
T. Cowlard and James A. Bede
Electroplating and Metal Finishing, Vol. 8, No. 9, September 1955, p. 322–323

123. PLATINUM METALS

a. *ELECTRODEPOSITION OF THE PLATINUM METALS*
Dr. Seymour Senderoff
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124. POLISHING

a. *POLISHING AGENTS FOR METAL SURFACES. SILICONE POLISHES (GERMAN)*
Fritz Ohl
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a. *PREFINISHED METALS COMBINE ATTRACTIVENESS WITH SAVINGS*
J. B. Mohler
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a. *RINSE TANK CONTROL*
J. B. Mohler
Metal Finishing, Vol. 53, No. 9, September 1955, p. 66–68

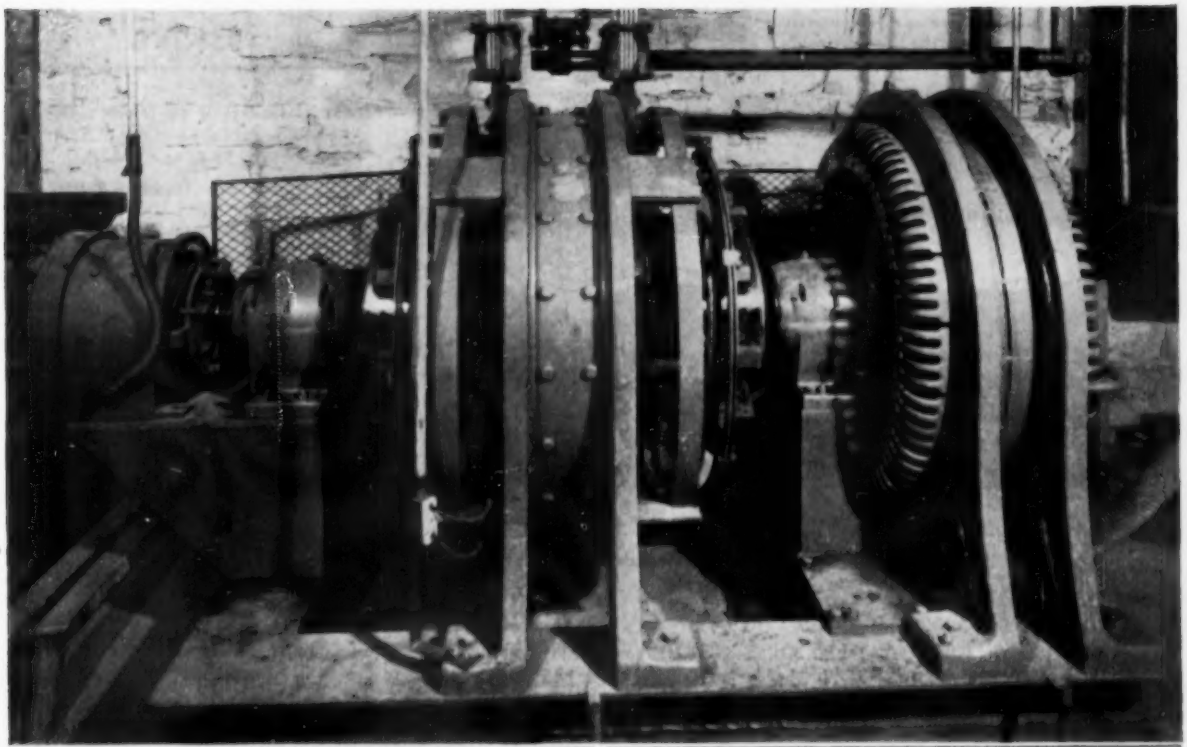
127. SPECIFICATION

a. *SURFACE FINISH OF METALS*
ASM Committee on Surface Finish
Metal Progress, Vol. 68, No. 2A, August 15, 1955, p. 82–88

b. *THE SELECTION OF ELECTROPLATED COATINGS*
ASM Committee on Electroplated Coatings
Metal Progress, Vol. 68, No. 2A, August 15, 1955, p. 97–105

Below are listed the addresses of publishers where the reader may send for article references.

Electroplating & Metal Finishing, 85 Udney Park Road, Teddington, Middx., England; **Iron Age**, 56th & Chestnut Sts., Philadelphia, Pa; **Metal Finishing**, 381 Broadway, Westwood, N. J.; **Metal Industry**, 9 Charlotte St., Birmingham 3, England; **Metalloberflache**, Carl Hanser Zeitschriftenverlag, GmbH, Munich 27, Germany; **Metal Progress**, 7301 Euclid Ave., Cleveland 3, Ohio; **Organic Finishing**, 381 Broadway, Westwood, N. J.; **Product Engineering**, 330 W. 42nd St., New York 36, N. Y.; **Products Finishing**, 431 Main St., Cincinnati, Ohio.



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BOOKS

Industrial Detergents by Niven. 384 pp. Reinhold Publishing Corp. $8.75 to nonmembers; $7.45 to members.

This book offers latest methods, materials and equipment used for industrial cleaning. It covers the composition of detergents for specific applications. How detergents are used, factors determining choice and usage of detergents, problems that arise and how they are overcome, how final results are evaluated.

Handbook of Barrel Finishing by Ralph Enyedy. 288 pp. Reinhold Publishing Corp. $7.59 to nonmembers; $6.35 to members.

Enyedy has drawn upon many years of experience as a barrel tumbling and finishing expert in preparing this manual of case histories. In addition to describing the use of typical equipment, media and compounds, the author presents more than 150 complete specification sheets. These sheets show a wide range of parts and give all the information necessary to finish them.

Handbook of Engineering Materials edited by Douglas F. Miner and John B. Seastone. Prepared by a staff of 52 specialists. 1382 pp. John Wiley & Sons, Inc. $17.50 to nonmembers; $15.00 to members.

This handbook, bound with a flexible cover, has been planned to give maximum help to the engineer in any field. The handbook provides information on such properties as electrical, thermal, physical, chemical and appearance. The arrangement and quantitative character of the data makes comparisons of competitive materials. Even where the search is for entirely new materials, the book's scope makes for fruitful research. The book itself is divided into four sections; general information on materials; metals; nonmetals; construction materials.

Temperature: Its Measurement and Control in Science and Industry, Vol. 2. Edited by Hugh C. Wolfe. 500 pp. Reinhold Publishing Corp. $10.00 to nonmembers; $8.50 to members.

Records the proceedings of the Third International Symposium on Temperature held in October 1954. Presents significant new material on techniques of determining temperatures from 0.001°K to the cure of an atomic explosion. Covers new revisions in the international temperature scale, techniques of resistance thermometry, use of super-conductors and semiconductors, temperatures in nonequilibrium situations, optical measurement methods, measurement in engineering and many other important topics.

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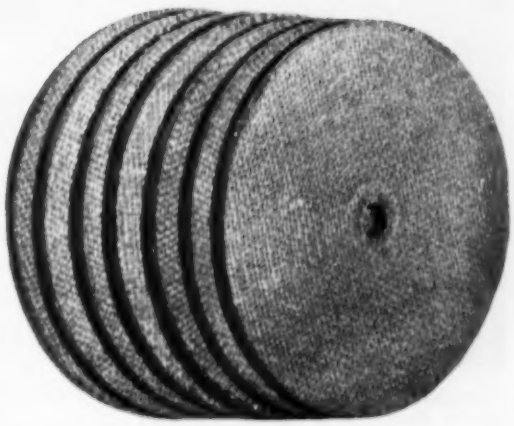

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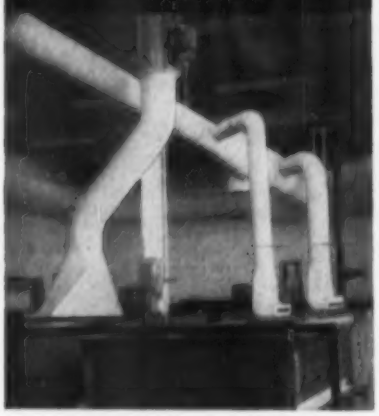

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Included in the system (in addition to hoods, ducts, stacks and caps) are molded PLA-TANK fan housings and propeller-type fan blades. *Everything that contacts the fumes is molded of chemical-resistant PLA-TANK.*

PLA-TANK, molded from long-life, resin-bonded glass fibre laminate is resistant to a wide variety of fumes and temperatures. It is lightweight, easy to install, competitively priced.

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OCTOBER 7, 1955

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We thought you might be interested in a pictorial record of what happened to one of your sustaining members during the floods of August 19. We are proud of our very rapid recovery from almost total destruction. Five weeks after the disaster, we were back in partial production and one week later full production was resumed.

During those six weeks we not only rebuilt our original plant but added enough space to enable us to eventually increase our production capacity 100 per cent.

Very truly yours,
Whyco Chromium Co., Inc.
J. Hyner
Treasurer

Editor's Note

The editors regret that a great many such reports reached us following the tragic floods of August in New England—certainly too many to carry here. All of them reflected a characteristic good cheer and the courage and belief in the future that characterizes the Yankee resilience. We run Whyco's report as being typical of them all. No one seemed to escape the fury of those August floods. Our own 2nd Vice-President's (F. Eddy's) company, Technicraft Inc., was among the victims.

SEPTEMBER 27, 1955

Dear Mr. Burnley:

Many thanks for the copies of your excellent media folder, based on the old NIAA Publishers Sales Presentation Outline.

I am taking the liberty of enclosing the revised NIAA outline which I do not expect you to use until your supply of the new PLATING folder is exhausted. Your new booklet is not obsolete because it contains essentially the same information as the new outline form.

My congratulations on a job well done; and, if there is anything further we can do to be of assistance, please do not hesitate to call on me.

Cordially,
John B. Manning
Director of Services
and Information

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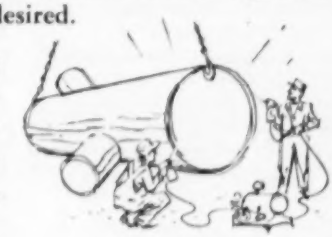
MICCROSOL SPRAY S-2003 IS READY . . . to show YOU the way to profitable spray jobs

You can apply S-2003 with conventional spray equipment.

You can apply 60 mils thickness in one application without sagging of material. If multiple coats are required, a short cure time is all that's needed between applications. A contrasting color can serve for layer identification, if desired.



You can use S-2003 in all plating baths. It has the same toughness—chemical, corrosion, and abrasion resistance as Miccrosol E-1003. Our adhesive systems provide outstanding adhesion to metal surfaces.

Solvent additives are not necessary. S-2003 is 100% solids and is sprayed as received. Time consuming and expensive adjustments are unnecessary. Problems of material instability and film cracking are eliminated. There is no solvent loss and less operator fatigue with Miccrosol Spray S-2003.

It's the ideal plastisol for spray applications.

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INTERSOCIETY NEWS

SPEAKERS, ASTM SYMPOSIUM, February 29, 1956, Hotel Statler, Buffalo, N. Y. Photograph shows authors of papers for forthcoming Buffalo symposium. In the usual order: A. M. Mendizza, S. Spring, W. Pinner, chairman; R. Herr, C. Sample and W. Blum. (Absent when photograph was taken: A. H. DuRose, G. Bowman and R. B. Teel.)

AES-ASTM COMMITTEE B-8 MEETINGS

Report of Meetings of ASTM Committee B-8, September 21-22, 1956
ASTM Headquarters,
Philadelphia, Pa.

Dr. Fielding Ogburn
National Bureau of Standards
Washington, D. C.

Subcommittee I—Specifications, Papers and Definitions

Chairman: Fielding Ogburn

1. The appointment of Walter Moline of the National Cash Register Co. as chairman of a Task Group on Electroless Plating was announced. This Task Group was established to find out if an ASTM specification on Electroless Nickel should be prepared.
2. Dr. George Nordblom of Frankford Arsenal gave a final report for the Task Force on Nondecorative Coatings. This group recommended that specifications on heavy nickel and heavy chromium coatings be prepared. This recommendation was accepted and will be followed up.
3. A symposium on the activities of Committee B-8 is scheduled for February 29, 1956 in Buffalo and a repeat performance for September 19, 1956 in Los Angeles. Eight papers, morning and afternoon sessions. For more details see W. Pinner. This symposium is designed to attract the interest of all in the plating field and will touch on all the activities of B-8.

Subcommittee II—Performance Tests.

Chairman: Walter Pinner

1. Preparation for a new exposure test program is well underway. This program is designed to (1) determine the effects of a nickel strike and of a copper strike under bright nickel; (2) determine effect of thickness of chromium over bright nickel; (3) determine effect of buffing a bright nickel coating; (4) compare buffed Watts nickel with bright nickel.
2. Harold A. Kahler was appointed chairman of a Task Group to propose an exposure test program for white-brass plating.
3. R. V. Vandenberg appointed chairman of a Task Force to propose an exposure test program for evaluating decorative coatings plated on aluminum.

Subcommittee III—Conformance Tests.

Chairman: R. Ledford

1. The joint ASTM-AES Committee on Specifications met on September 21st with the following in attendance: C. Sample, R. Saltonstall, D. Thomas, F. Ogburn, M. Darrin, M. Frager, K. Huston, W. Pinner and Chairman R. Ledford.
2. The committee recommended that the AES Executive Board endorse all amendments and revisions to specifications or practices to date. It was further suggested that amendments and revisions be published in PLATING and clarified by a brief write-up explaining the effects of these changes on the overall specification or practice.
3. It was reported that the B-8 compilation of ASTM specifications and practices endorsed by AES will be published early in November.

Subcommittee IV—Electroplating Practice.

Chairman: Max Frager

1. A Recommended Practice on the Preparation of Lead and Lead Alloys for Electroplating has been drafted by a group under the chairmanship of George Herrmann.
2. A Recommended Practice on the Cleaning of Metals for Electroplating has been drafted. This will be the subject of a paper by Dr. Sam Spring at the Buffalo meeting. Dr. Spring is chairman of the Section preparing this Recommended Practice.
3. Henry Karfarski was appointed chairman of a Task Group on Water for Electroplating purposes. It was brought out that in some parts of the country, water treatment or purification is a definite problem to the plating shops. The Task Group will determine if this should be the subject of a Recommended Practice.

Subcommittee V—Supplementary Treatments for Metallic Coatings.

Chairman: Marc Darrin

1. This is a very active group. Discussion of its work brought out that aging of zinc plated specimens radically changed their performance in the humidity cabinet test. This effect will be further investigated.

ASTE Charters New Chapters; Names Program Director for 1956

Latest chapter charterings of the American Society of Tool Engineers spanned the continent with new chapters in Centinela Valley, Cal., and Monmouth, N. J., receiving their charters.

The Centinela Valley chapter received Charter No. 129. It draws its membership from the Redondo Beach, Manhattan Beach and Los Angeles Airport area.

The Monmouth chapter received Charter No. 130. Its membership is from Red Bank, Eatonton, Long Branch, Asbury Park and Fort Monmouth.

The new chapters each added more than 100 members to the Society which now has over 32,000 members in the United States and Canada.

The Centinela Valley chapter charter was presented by Ben Hazewinkel, ASTE National Director from Los Angeles. Charter chairman is William B. McKay, tool engineer at Douglas Aircraft Company, El Segundo, California.

ASTE National Director Richard A. Smith of Hartford, Conn., presented the charter for the Monmouth chapter to charter chairman John L. Webster. Webster is factory manager of the Red Bank Division, Bendix Aviation Corp., Eatonton, N. J.

Col. Leslie S. Fletcher, Research Director of the American Society of Tool Engineers' Research Fund, has been named Program Director for the Society's 1956 annual meeting technical sessions. The sessions will be held in conjunction with the ASTE Industrial Exposition which is being held in Chicago's International Amphitheatre, March 19-23.

The Society's National Program Committee, headed by Philip R. Marsilius, vice-president, Producto Machine Company of Bridgeport, Conn., is assembling one of the most significant series of technical sessions in Society history. Each session topic has been selected for its importance to the technological progress of the country, Marsilius said.

IMF's New President and Council

The Institute of Metal Finishing announces that the Officers and Council for Session 31 (1955/56) are as follows:—President: R. A. F. Hammond, B.Sc., A.R.C.S., F.R.I.C.; Immediate Past President: Professor J. W. Cuthbertson, D.Sc., F.I.M., A.M.I.E.E.

Vice-Presidents: S. G. Clarke, D.Sc., A.R.I.C., F.I.M.; T. P. Hoar, M.A., Ph.D. (Cantab.), B.Sc. (Lond.), F.R.I.C., F.I.M.; L. B. Hunt, M.Sc., Ph.D., A.R.C.S., F.R.I.C.; R. W. Nicol; H. Silman, B.Sc. (Lond.), F.R.I.C., M.I.Chem. E., F.I.M.; A. Smart, B.Sc.; A. W. Wallbank, B.Sc., F.R.I.C. Honorary Treasurer: F. L. James. Honorary Secretary: S. Wernick, Ph.D., M.Sc., F.R.I.C., F.I.M.

Members of Council: G. L. J. Bailey, Ph.D., D.I.C., F.Inst.P.; W. F. B. Baker, A.M.I.E.E.; J. E. Garside, M.Sc. (Tech.), Ph.D., F.R.I.C., F.I.M., M.Inst.F.; A. A. B. Harvey, M.Sc. (Lond.), A.R.I.C., Barrister-at-Law; D. N. Layton, Ph.D., M.Sc., A.R.C.S., D.I.C., A.Inst.P.; L. Mable; R. T. F. McManus; C. Wharrad; F. Wild, A.I.M.

Ex-Officio: E. E. Longhurst, Ph.D., Chairman, London Branch; L. Mable, Chairman, Midland Branch; W. A. Bowker, Chairman, Sheffield & North-East Branch; B. J. Jones, Chairman, North-West Branch; S. A. J. Murray, Chairman, Scottish Branch; W. Stein, Ph.D., F.R.I.C., Chairman, Organic Finishing Group.

The Society of Die Casting Engineers Forms New Western Michigan Chapter

A new chapter of the Society of Die Casting Engineers was officially formed when the Western Michigan group was awarded a charter at a recent meeting held in Grand Rapids, Mich. On hand to make the presentation in behalf of the parent group were two officers from society headquarters: George Griffenham, secretary, and Mike Tenenbaum, treasurer.

The new unit represents the first expansion for the Society of Die Casting Engineers since its formation as the Detroit No. 1 Chapter on October 1, 1954. The main objective of the society is the exchange, accumulation and dissemination of the latest information and knowledge in the arts and sciences of die casting, die molding, finishing and related arts. Membership is open to those whose business activities relate to these fields.

Officers of the Western Michigan No. 3 Chapter for the calendar year 1956 are: chairman, James Thorpe, vice-president-engineering for Nelson Metal Products, Inc.; secretary-treasurer, C. Herbert Lloyd, western Michigan representative for E. F. Houghton & Co.; and librarian-historian, C. Nelson Smith of Production Aluminum Company.

The new chapter will tentatively make its headquarters in Grand Rapids, Mich.

Seventh Plant Maintenance and Engineering Conference

Fifty sessions on 26 aspects of factory upkeep will highlight the seventh annual Plant Maintenance & Engineering Conference to be conducted in Philadelphia in January.

The conference, the largest annual industrial gathering of its kind, will be held concurrently with the Plant Maintenance & Engineering Show at Convention Hall, Philadelphia, January 23–26.

About 2,500 engineers are expected to attend the conference and some 20,000 industrial executives are expected at the show. L. C. Morrow, consulting editor, "Factory Management & Maintenance," will serve as general chairman of the conference.

The show is one of the largest annual industrial expositions in the country. It has not been held in the East since 1952. About 400 companies are expected to exhibit some 5,000 different products and services in 278 basic types.

The 1956 program will be arranged in three groups. There will be two general conferences, which all registrants attend; eight concurrent sectional conferences, at which papers will be read but the audience will split, and 16 concurrent, informal round tables for discussions of special problems. Each of the eight sectional conferences, and the 16 round tables, will be repeated during a second evening.

Six industries will receive special attention in the round tables. The air transport, chemical, iron foundry, petroleum refining, paper mill and paper product and textile industries will have sessions devoted exclusively to maintenance problems in their respective plants.

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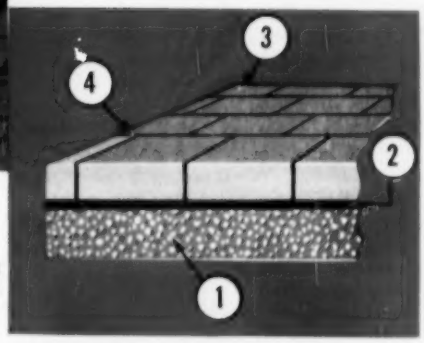

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BALTIMORE-WASHINGTON CONVENTION

Plating Staff Photo

Gen. Chairman Art Pierdon goes over budget and Convention plans with more than 50 committee people at the Statler on September 16. Front row: AES President Clyde Kelly, Mrs. A. Pierdon (chairman, Ladies' Program), Dr. Wm. Blum (Honorary Chairman), and Miss M. Pierdon (recorder)

Plant Visitation

The plans for the 1956 Convention are proceeding according to schedule. A general committee meeting was held at the Statler in Washington, D. C. on September 16. (The Statler is the Headquarters Hotel for the Convention). Welcome guests at the meeting were President Clyde Kelly, Executive Secretary Pete Kovatis, PLATING Editor Archie Doria, and Joe Duffy, representing the MFSA.

Among the subcommittee chairmen reporting was Vincen J. Hughes, Jr. "Josh" is in charge of Plant Visitation. Four trips are planned. At the Bureau of Engraving, we will see the operations of electroforming in iron and nickel and chromium plating. These are steps in reproducing the printing plates. The trip will continue through the pressrooms where they actually make that green stuff and you can see it hauled around by the wheelbarrow load.

Hughes

The Bureau of Standards has planned a tour which features the Electrodeposition Section. This section is the source of a large percentage of technical guidance our industry has received for a number of years. The Potomac Electrotype Company will show us a high precision electroforming operation. The fourth trip is scheduled for an industrial plant in Baltimore, Maryland. Details will be available later.

Many of the Visiting Firemen will want to include the Convention in a vacation trip. The Program is being planned with a view to allowing as much time as practical for sightseeing in Washington. A sightseeing information desk is expected to be available to help those who want to go out on their own. From time to time, this department will include suggested short trips which can be made in addition to the planned tours.

If the vacation time available is long enough, there are excellent beaches on the Chesapeake Bay. Historical Baltimore, the Birthplace of the Star Spangled Banner, is only 40 minutes from Washington and there is a train every hour. While in Baltimore, Haussner's Restaurant at Eastern Avenue and Clinton Street is an excellent place to sample typical Maryland sea-food delicacies such as Chincoteague oysters and the many delectable dishes concocted from the Chesapeake Bay Blue Crab. The Haussner Art Collection, on display in the restaurant, includes paintings, sculpture, and art objects from all over the world, and is itself worth the trip. To the South, Williamsburg, Virginia is a restored Colonial town rich in the heritage of Revolutionary times. The home of Thomas Jefferson at Monticello, Virginia was designed and the building supervised by that versatile statesman.

These suggestions are just a hint of the many attractions that will make the 1956 Convention an excellent opportunity for a family vacation as well as an opportunity for the "Advancement of the Science of Electroplating." "WASHINGTON, D.C. in 1956—A CAPITAL IDEA."

Plating Staff Photo

Looking over 43rd AES Convention Program of Host Baltimore-Washington Branch are Dr. P. J. Rich (left), F. Ogburn, AES Convention Registration Program Chairman (center), and National 3rd Vice-President of the AES, H. Head. Photograph was taken at the ASTM B-8 meeting in Philadelphia recently

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AES Research Committee Meeting, September 23, at National Headquarters

On Friday, September 23, the AES Research Committee met at National Headquarters (see cut). R. Wick, and R. Ledford attended as guests.

The meeting turned out to be as highly productive as it was interesting. A. DuRose distributed the Vice-Chairman's report, which was immediately accepted.

E. Bowerman, in reporting on Project 16, stated that the Fellow would report during the last week of September. Bowerman went on to point out that the objectives of his committee were to study "reaction-kinetics of metal ion deposition with respect to activation controlled polarization." He said that the immediate objective was to determine parameters of deposition kinetics or selected metal ions having different polarization characteristics.

Project 17 was allocated an additional $1000 for a total of $8200.

Secretary Kovatis reported that there were 312 Sustaining Members as of August 31, 1955, as compared to the same number in August 1954. A total of 351 multiple Sustaining Memberships were reported for August 31, 1955, as compared to 354 for the same month in 1954.

The committee recommended to the Executive Board that the Society subscribe $1000 to the Research Council of the Engineering Foundation under a plan as described by Dr. Wick in connection with research in corrosion.

On the matter of Buffing and Polishing Proposal, C. Kelly reported that his Chicago group intended to poll job shops as to type of buffing for the project.

Borchert Announces Two New Research Projects

Two new research projects have been approved by the American Electroplaters' Society, it has been announced by AES Research Chairman Leslie C. Borchert of Houdaille-Hershey Corp., Detroit, Mich. One on Micro-Throwing Power will be conducted at the Virginia Institute for Scientific Research at Richmond, Va. under the direction of Dr. Henry Leidheiser, Jr. of the institution and the other on the Mechanism of Plating (polarization, cathode reactions etc.) at the University of Penna. under the direction of Dr. J. O'M Bockris and Dr. B. E. Conway of the John Harrison Laboratory of Chemistry at that University.

Dr. Wolfgang Mehl of Max Planck Institut, Gottingen, Germany is the Fellow at the University of Pennsylvania project.

Dr. R. A. Schaefer of Clevite-Brush Development Co., Cleveland, Ohio, National Past President of the AES, is district supervisor responsible for the two new projects. The project directing subcommittee are as follows: Univ. of Penna. —E. R. Bowerman, Jr., Sylvania Electric Products, chairman; Dr. W. Blum, Nat'l Bureau of Standards (retired), and Dr. O. Kardos, Hanson-Van Winkle-Munning Co. At the Va. Institute for Scientific Research, the project directing subcommittee includes Dr. W. H. Meyer, Enthone, Inc., chairman; R. McKay, International Nickel Co. (retired) and R. T Putnam, Pratt & Whitney Aircraft Division, UAC, E. Hartford, Conn.

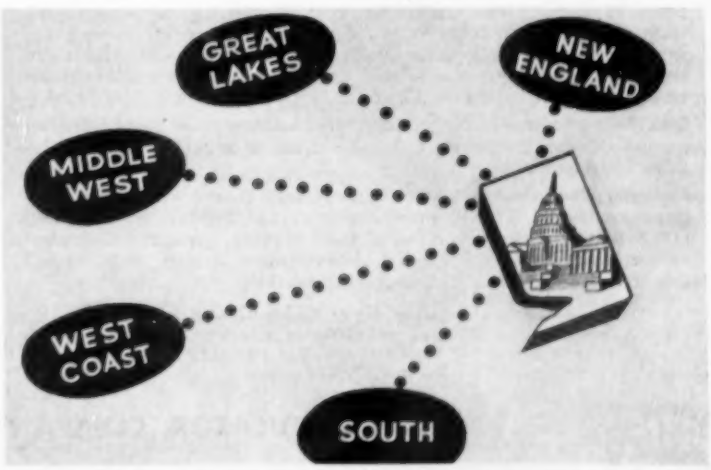
The two new projects increase the number of AES-sponsored researches to eight. Other projects include the following: "The Effect and Removal of Impurities in Plating Solutions," Michigan State College; "The Disposal of Plating Room Wastes," Yale University; "Cleaning and Preparation of Metals for Electroplating."

Plating Staff Photo

The AES Research Committee, at its meeting at National Headquarters on Sept. 23 posed thusly for this picture: l. to r., E. Bowerman, R. Ehrhardt, A. DuRose, C. Sample, E. Parker, P. P. Kovatis, L. Borchert, chairman; Clyde Kelly, AES President; Dr. R. Wick, R. Racine, Dr. Wm. Blum, A. Wrisberg

WASHINGTON, D. C. IN 1956 . . .

A Capital Idea



WASHINGTON CONVENTION—JUNE 17-21, 1956

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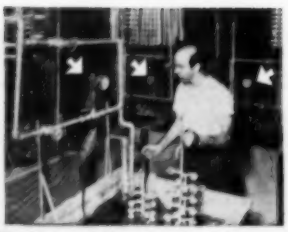

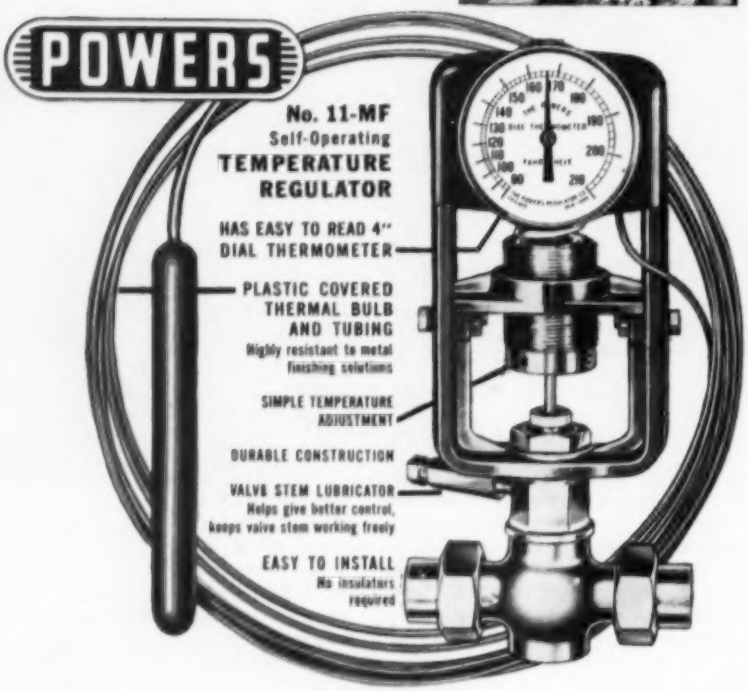

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AES NEWS

Columbia University; "The Nature, Cause and Effect of Porosity in Electrodeposits," Nat'l Bureau of Standards; "The Effect of Basis Metal Condition on Plating," Ontario (Canada) Research Foundation; and "Accelerated Corrosion Tests," Detroit Area.

The AES research program is made possible through sustaining memberships by more than 300 industrial firms and a yearly dollar assessment of the more than 7,000 AES members throughout the world.

Leidheiser

Dr. Henry Leidheiser, Jr. obtained his BS (1941), MS (1943), and PhD (1946) degrees from the University of Virginia. He is active in the Virginia Academy of Science, serving as Secretary and Chairman of the Chemistry Section; Feature Editor for the Bulletin of the Virginia Section of the ACS; and abstractor for Chemical Abstracts. He is also a member of Sigma Xi, Raven Society (local at University of Va.).

Dr. Leidheiser is Research Director at Virginia Institute for Scientific Research, Richmond, Va.

Dr. Brian E. Conway attended Imperial College of Science (University of London) where he obtained his BS and ARCS (1946), PhD and DIC (1949). He is an active member of the Faraday Society, Fellow of the Chemical Society (London), Associate of the Royal Institute of Chemistry and member of the Society of Chemical Industry (London).

Dr. Conway is Assistant Professor of Chemistry at the University of Pennsylvania.

Conway

Bockris

Dr. John O'M. Bockris attended London University where he obtained the degrees of BS (1943), PhD (1945) and DS (1951). He is an active member of the International Committee for Electrochemical Thermodynamics and Kinetics (member of the Editorial Board), and of International Commission on Nomenclature and Definitions.

New Name Under Consideration for Plating as AES Exec Board Meets in Cleveland

Effective 1956, The Annual Proceedings of the Society will be known as follows: Technical Proceedings, that compendium of convention papers, AES research articles and other technical articles appearing in PLATING during the year. In addition, non-technical information such as location of libraries, branch location, etc. will be deleted from future Technical Proceedings and added to Business Proceedings, the record of Supreme Society meetings. The decision to change the designation of Proceedings was one of many actions taken by the Executive Board at its October meeting in Cleveland, Ohio.

Under the chairmanship of President Clyde Kelly, the Board acted on the following items of business:

Heard a report from 1st Vice President Samuel Heiman on the progress of the Branch Officers' Manual;

Recommended to the Editorial Board the matter of publishing a review of current literature and articles in the field every five years;

Approved the printing of a booklet to solicit papers for PLATING from prospective authors;

Authorized an application refund to $5.00 for each Member-at-Large transferring to a new branch, provided the member transfers on or before the date of new branch formation;

Heard preliminary reports from E. L. Combs, Cleveland Convention Chairman and L. Westbrook, Cleveland Exposition Chairman; commended both chairmen and their committees for an excellent job;

Approved the 1955–56 AES Research budget and plans;

Authorized the allocation of additional funds to the Research Program "when more appropriate projects become available.";

Approved the revision of the "AES and You" folder;

Approved the format of a new membership folder;

Received reports from chairmen of Washington, Montreal, Cincinnati and Detroit convention committees;

Reviewed an index of Society publications prepared by Virginia Polytechnic Institute and deferred to future meeting pending further study;

Confirmed the payment of $250 to the Editor of the Branch Officers' Manual;

Authorized the contribution of $1,000 to the Corrosion Research Council of the Engineering Foundation to help "sponsor a broad investigation of the basic chemistry, physics, and metallurgy that underlie corrosion phenomena."

Proposed to consider changing name of official journal;

Approved D. Bedwell's application to National Honorary Membership from Los Angeles branch;

Disapproved idea to hold Interim Meeting in 1955–56;

Authorized the reactivation of the Society Public Relations Committee under the chairmanship of the Executive Secretary;

Heard reports commending Plating Advertising Manager H. George Burnley for an "excellent and informative" Media Data File.

Mississippi Valley Branch Formed

A total of 38 members were signed up recently in the newly formed Mississippi Valley Branch of the Society. This announcement was made by Paul G. Chamberlain, secretary-treasurer of the new branch.

Newly elected officers include Lloyd O. Gilbert, president; Joe McConnaughey, 1st vice president; Bernard Nordblom, second vice president; Paul G. Chamberlain, secretary-treasurer; John Hartman, librarian; and Board of Managers—Frank Bryant, John H. Miller, Carl Dunk, and Kermit Wolff.

A petition for a Temporary Branch Charter was received at National Headquarters and will be presented to the Executive Board for approval at the January meeting. Our congratulations and best wishes to the officers and members of the Mississippi Valley Branch for their continued success.

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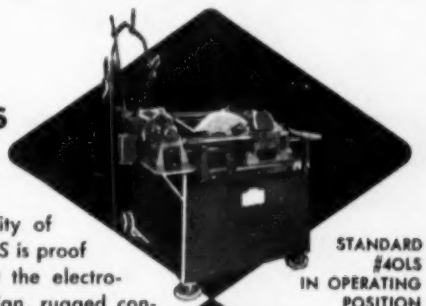

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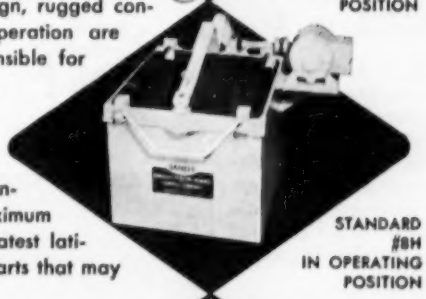

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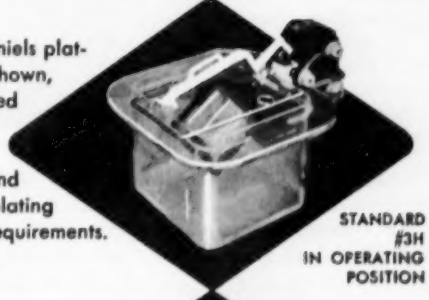

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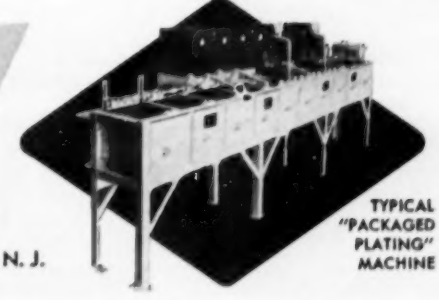

TYPICAL "PACKAGED PLATING" MACHINE

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At their Washington, D. C. meeting on September 16 the Editorial Board looked like this: l to r, A. W. Logozzo, A. Brenner, J. Capuano, A. Doria, R. Harr, F. Fulforth, AES President, Clyde Kelly, L. Scott, L. Dively, W. Tucker. (Chairman Kovatis took the picture. The peaches were courtesy of Art Logozzo—as a sample of New England's produce.)

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AES Publications Committee Named

Schaefer

National Past President Ralph A. Schaefer of the Clevite Brush Development Company was named Chairman of the AES Publications Committee recently by Society President Clyde Kelly. This committee is charged with the responsibility of reviewing policies and procedures in connection with Society publications and making recommendations for improvement as well as for the addition of new publications.

Dr. Schaefer's committee comprises the following members: Dr. Earl J. Serfass, Lehigh University; Dr. Ralph F. Muraca, Jet Propulsion Labs, California Institute of Technology; Dr. Richard B. Saltonstall, Udylite Corporation; Edward R. Bowerman, Jr., Sylvania Electric Products.

Wick to AES Liaison Post Corrosion Research Council

Dr. Richard Wick of Bethlehem Steel Company, has been appointed to represent the Society on the Corrosion Research Council of the Engineering Foundation, it was announced this month by Clyde Kelly, AES President.

Wick

Wick, who has been active in the Society research program, is also the Society's representative to the Intersociety Corrosion Committee of the National Association of Corrosion Engineers. He is a member of the Allentown-Reading Branch of the Society.

This appointment comes on the heels of a $1,000 AES contribution to the Corrosion Research Council by the Society for extensive research in corrosion.

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Our new film "The Warning Shadow" will tell you what every man should know about lung cancer. To find where and when you can see this film, and to get life-saving facts about other forms of cancer, phone the American Cancer Society office nearest you or simply write to "Cancer"—in care of your local Post Office.

American Cancer Society

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Many years of use, hundreds of hours of proven performance, and an impressive list of satisfied customers still haven't proven Probrite to be a miracle product, but they *have* proven that you can waste a lot of time and profit—*waiting* for a miracle.

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BRANCH NEWS

THE NICKEL STORY IN DETROIT

"The Nickel Story" will be the featured theme of the annual meeting of the Detroit Branch at the Statler Hotel on Friday, December 2 at 8 P.M. Speakers and topics:

H. B. Director, Dept. of Commerce, Washington, DC— "The Nickel Situation from the Government Standpoint."

D. Bigge, Chrysler Corporation—"The Impact of the Nickel Shortage on the Plating Industry."

Dr. A. K. Graham, Graham, Crowley and Associates— "Substitute Finishes for Nickel."

The following evening, Saturday, December 3 at the Statler Hotel, will wind up the annual meeting with the traditional Christmas Party and Banquet. Chairman of this year's festivities is Wright Wilson of Auto City Plating Company, according to J. C. Drinkwater of Heatbath Corporation, Detroit Branch Public Relations Chairman.

COLUMBUS

Hydrogen Embrittlement by Faust and McGraw

The regular monthly meeting of the Columbus branch AES was held at Battelle Memorial Institute on Friday, September 2 at 8:00 p.m.

Following a movie entitled "Paper Making," President **Nathan Koslin** called the business meeting to order.

The minutes of the May meeting were read and approved.

Walter Denney, member of the permanent Tri-state Committee, reported on the meeting of that committee at the convention in Cleveland; also, that the 1956 Tri-State Regional Meeting will be held at the Dayton Biltmore Hotel on March 10, with the Dayton branch as host.

President Koslin reported on the Columbus branch exhibit at the Ohio State Fair, and thanked those who participated.

Treasurer **Wilbur Hespenheide** distributed membership cards and requested that outstanding dues be paid as promptly as possible.

There being no further business, the business meeting was adjourned.

Librarian **Harry Moore** then introduced the speakers of the evening, **Dr. Charles L. Faust** and **Dr. Leslie D. McGraw.** Their subject was "Hydrogen Embrittlement, Causes and Cures."

After an interesting talk and question and answer session, refreshments were served by **Jack Spenard.**

MICHAEL FARR, JR., Secretary

CENTRAL MICHIGAN

Golf, Food and Business

The Central Michigan branch met on Saturday, September 17, at the Mason Country Club, Mason, Mich., for their annual golf stag and picnic. Golf and door prizes were awarded by the committee chairman, **William Mogle,** who later received a rising vote of thanks from the 95 members and guests who enjoyed a pleasant day of golf and an excellent lunch and dinner.

G. S. WOODRUFF, Publicity

PHILADELPHIA ANNUAL EDUCATION SESSION

On Saturday, November 19, the Philadelphia branch will hold its Annual Educational Session and Banquet at the Benjamin Franklin, Philadelphia. The Educational Session will feature talks by: Henry Strow, (True Brite Chemical Products Co.), "Advance Techniques in Copper Plating"; Dr. A. Kenneth Graham, (Graham, Crowley & Associates), "New Concepts With Respect to the Use of Nickel or Nickel-Chromium Coatings"; Richard S. Scott, (The Udylite Corp.), "Electrical Circuits in Electroplating."

The banquet at 7:00 will be followed by a show and dance.

MEET MR. PRESIDENT*

Tom Austin
Newark Branch

A large, strapping affable man who speaks softly is Tom Austin of the Newark Branch. An untiring worker, a man who gives much of himself to everything he does, Tom moves with sureness through the sprawling plant of the Rowe Manufacturing Co.

Austin has served the Newark Branch in many capacities before assuming the Presidency last March. He has been Sergeant-at-Arms, Librarian, 2nd Vice-Pres., 1st Vice-Pres., as well as a member of the Educational Committee during the last seven years.

Tom Austin was born in Oakland, California in 1922. He moved to Boonton, N. J. in 1933 and attended High School in that city. After graduation in 1940 he attended New York City College, Newark College of Engineering and Rutgers University.

For the last several years he has been employed by the Rowe Manufacturing Co. of Whippany, N. J. He is still with them as Supervisor of plating, tumbling, heat treating, silver soldering, paint stripping, and various aluminum treatments.

He is married and has two children. In addition to his membership in the AES he is active in several community groups serving at present as Vice-President of the local fire department and is in line to become an officer of the local First Aid Ambulance Squad.

Tom claims no special hobbies but adds "I spend what spare time there is painting and refinishing our new home that sits on top of a hill that overlooks the city of Boonton."

*Feeling that Branch Presidents are much too much "the unknown man" in the AES, this department has been instituted. As biographies and pictures are received they will be run here.

DALLAS-FORT WORTH

Good Start to a New Year

The new year in the history of the Dallas-Fort Worth branch started with a bang; door prize, good speaker, new members and visitors.

The door prize was a fine coffee maker and won by **John Seljan,** who along with his brother **Emil,** became new members.

Joe F. Day of Udylite Corp. was our speaker and gave us more practical knowledge about rectifiers, their construction, trouble shooting and plating room hook-up than we were ever privileged to hear. Of much keen interest to all present was the story of germanium rectifiers and the developments in recent months.

Twenty-one members and visitors were present. Three new members.

R. H. HEPPEL, Secretary

DAYTON

Brilliant Opening with Two Speakers

The Dayton branch opened the fall season with a meeting at the Dayton Biltmore on September 21, with 33 members and friends present.

The program got underway at 8:30 P.M. with the introduction of **Lt. Donald Ruck,** metallurgist, WADC Wright Field, who presented a short talk on "The Potential of and The Current Thinking on the Uses of Titanium."

Acting librarian, **Julius Teres** then introduced the main speaker for the evening, **Clifford Struyk,** Technical Service Dept., General Chemical Div., Allied Chemical and Dye Corp. who gave a paper "Plating from Fluoborate Solutions." He discussed the advantages and disadvantages of the use of fluoborate solutions and by the use of color slides was able to show us a good many actual installations. Of particular interest was an installation some 240 feet in length capable of plating 50 wires at a time at speeds of 80 ft/min whereby 3 mils of copper are plated

in 3 minutes time at current densities approaching 2000 amp/ sq ft. Struyk was given a rising vote of thanks for an excellent paper.

We were treated to refreshments after the meeting through the courtesy of Ruco, Inc. Dayton, Ohio and their representatives and Dayton members, **Bob Ruleff, Ray Coy, Frank Klein** and **Jim Shane.**

Four new members were accepted at this meeting. **Frank R. Jacobs,** plating supervisor, Ex-Cell-O Corp. Lima, Ohio; **M. Richard Myers, Jr.,** chemist, Ex-Cell-O Corp.; **George S. Johnson,** sales supervisor, Kelite Corp. Chicago, Ill.; and **Paul R. Allison,** process engineer, Moraine Products Div., GMC, Dayton, Ohio.

R. M. Clinehens
Secretary

HAMILTON

Dan Mundy Takes the Prizes

The Hamilton branch held its opening meeting of the 1955–56 season on Friday, September 19, at Fischer's Hotel, with 16 present. The technical quiz program, led by president **Bill Finlay,** sparked many interesting discussions. The oldest member present, **Dan Mundy** won the most number of prizes.

Norman A. Graham
Secretary

HARTFORD

House on Plating Barrels

The regular branch meeting was held at the Bond Hotel on September 19 and in spite of threats from hurricane Ione 37 members and guests were present.

The guest speaker for the evening was **Norman House,** chief engineer for La Salco, Inc., whose subject was "What Happens in a Plating Barrel." During the talk a movie by the same name was shown to more effectively illustrate the tumbling of parts in a plating barrel.

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BRANCH NEWS

House discussed the type of materials used in constructing plating barrels, various sizes made, speed of barrel, sizes of holes in panels, etc. A recommended speed of barrel was suggested, one as slow as possible and yet obtain good tumbling. Most barrels are used for small parts that are uneconomical to rack. Illustrations were given of loading the barrel by the bulk method and area method. The movie well illustrated the overloading of a barrel and its results. An interesting question and answer period followed the talk.

The technical chairman for the evening was **Emile Beloin.**

STANLEY PLATOZ
Secretary

KANSAS CITY

Meeting Time Changed

The September 29 meeting was at the Berkshire Hotel, at 7:00 P.M., with 21 members present.

Following the dinner, the business meeting was held. Membership report was given by first vice-president, **Glenn Wilson.** Prospects look very good.

A general discussion was held regarding meeting place and method of making reservation. Motion made and carried that a member making a reservation is responsible for cost of the dinner if cancellation is not made before 5:00 P.M. on day of meeting.

It was decided that the meetings for the coming year will continue to be held at the Berkshire Hotel, located at Troost and Linwood Boulevard.

Motion made and carried that our meetings would be changed to correspond with the Thursday following the St. Louis branch meeting which is the third Wednesday of each month.

Henry DeWitt, librarian, outlined the program for the winter months which met wholeheartedly with the members' approval.

Meeting was concluded by the showing of a film entitled "Clean Waters" which was produced by General Electric.

OLIN BOCK
Secretary

LOS ANGELES

Membership Contest

The final meeting of the Los Angeles branch for the summer was held on June 8 at the Rodger Young Auditorium. It was very gratifying to the officers to see such a large turnout. We had 94 present at this particular meeting, 80 of these being members.

A membership contest was announced by the membership chairman **V. P. Truman Stoner.** This will run from September through March and he announced that a first prize of a $50.00 gift certificate and a second prize of a $25.00 one will be given to the member writing up the most applicants. Every member of the branch is eligible excepting those whose name appears on the official stationery of the branch. He also introduced six new candidates for membership in the branch and they will be installed in September. President **Earl Arnold** installed the following men as new members: **Ralph Humphreys** of North American Aviation; **Donald D. Steel** of the Calif. Metal Processing Co.; **Clare P. Ver West** of the Mefford Chemical Co.; **Rudolf Mastaler** of the Master Plating Co., Phoenix.

The speaker of the evening, **Joe Byouk** of the General Chemical Co. presented a very interesting paper on "New Developments in Fluoborate Solutions." A lively discussion period followed and the meeting adjourned at 10:00 p.m. **Don Bedwell** was welcomed back by the branch after a month in Hawaii.

G. J. HETZ
Secretary

MILWAUKEE

Geissman on the AES

The opening meeting for the new year was held at the Meadowbrook Town & Country Club in Racine, Wis. President **H. Tessman** gaveled the meeting to order with some seventy members present. The minutes of the last meeting and financial report was accepted as read, and the tentative budget approved. Auditing committee and annual committee reports were received and would be discussed at the next meeting.

Librarian **J. Severson** discussed the program for the coming year, and then introduced **Wm. Geissman** who gave a short keynote address on the AES.

The chairman for the Racine meeting, **Wm. Heinen,** announced that two door prizes were donated and were from: John Oster Co., Racine; Hamilton Beach Co., Racine.

Bill Heinen thanked the many suppliers and job shops that donated to make this meeting possible. After some fine entertainment the meeting was adjourned. Those present retired to a buffet luncheon which was sponsored by the many contributors.

C. PETER
Sec. Treas.

MONTREAL

Dinner-Dance Instead of Stag Banquet

The Montreal branch of the American Electroplaters' Society held its first Dinner-Dance at the Queen's Hotel on Friday, September 30. This—rather than the usual Stag Banquet—was decided on by a majority vote, to enable the ladies to meet one another, since we shall require their assistance and cooperation with the various committee meetings for the 1957 convention.

The evening was a complete success. Canadian Hanson Van Winkle Co. Ltd. sponsored the cocktail hour, while Armalite, Ltd. presented brooches to the ladies. Our other suppliers contributed financially, and, thanks to **Bert Kelly,** 56 door prizes were donated by various companies.

Everyone enjoyed the melodious strains of Lanny Edwards' orchestra, and the gentlemen's Can-Can Chorus was indeed something to see!

It is the general consensus of opinion that this Dinner Dance will become an annual affair.

We only hope that our American friends will enjoy themselves equally as much when attending the 1957 convention in our fair city, as did those at the Dinner-Dance.

JEAN MONETTE
Secretary

NEWARK

Eddy on the Flood and the AES

The first meeting of the Newark branch for the 1955–56 season was held on September 16 with vice-president **William Grigat** in the chair for **Tom Austin,** present but just out of the hospital.

The business meeting consisted of accepting six applications, transferring **A. Nortof** to Cleveland and **David Roney** to Newark from Pittsburgh. **Dodd Carr** reported the Newark school for electroplaters moving into the final preliminary phases with 32 having paid the enrollment fee.

Gustav Bittrich then introduced **Francis Eddy,** second vice-president of the AES who, in response to many requests at dinner prior to the meeting, described the recent flood damage in Connecticut briefly. Frank then discussed Society membership in terms of advantages to members and value of more members to the Society and each branch, urging that efforts be made to increase branch rolls.

The chief speaker of the evening, **John Swift** of Swift Industrial Chemical Co., Canton, Conn. then presented an interesting talk on "What Every Plater Should Know About Metallurgy." Limiting his comments to ferrous metallurgy, Swift described steel making and forming, pointing out the different types of steel and the divers working operations which yield surfaces of

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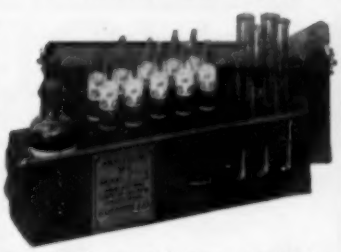

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varying quality and response as far as the plater is concerned. Numerous slides showed examples of the types of steel and served to point out that all the platers difficulties are not of his making—some of them are due to the use of the wrong steel.

Frank Eddy was called back to report to the Newark branch on the Cleveland Convention after which both speakers were given a rising vote of thanks.

At the conclusion of the Educational Session the 65 members present spent a pleasant hour chatting fortified by change, sandwiches and beer.

D. Gardner Foulke
Secretary

NEW HAVEN

Dr. Schaefer and Francis Eddy Attend

The September meeting of the branch was held on September 13, at the Mason Laboratory, Yale University.

President **William K. Murray** opened the meeting with the roll call of officers and there was just one absentee. Among guests present from the Waterbury branch was National Second Vice-President **Francis T. Eddy.** A report on a previous business meeting was given and accepted.

A discussion followed in regard to the New England Regional. As the host branch it is necessary to make arrangements early for this event. It was decided that the Hotel Statler in Hartford would be the most desirable site since the regional has grown to such proportions that a New Haven site would be inadequate.

The Christmas Party was discussed and chairman **W. E. Bridgett** was authorized to investigate Lou Duncan's in Hamden.

The Platers course in New Haven Teacher's College is being offered again by **Ed Foley** and is well worth the $42.00 tuition.

The applications of two new members were submitted and accepted.

Technical chairman **Leo Roberti** then introduced the main speaker of the evening—AES Past Pres. **Dr. Ralph A. Schaefer** (vice-president of Clevite Brush Development Co.) whose topic was "Electroplating of Silver." The talk which was of great interest to the group was supplemented by slides. The industrial plating of silver is of particular interest to the aviation industry. Dr. Schaefer's experience on internal bearing surfaces induced a series of questions pertaining to procedures and techniques not usually appreciated by decorative platers.

The evening was a most gratifying beginning of the new season. The door prize was donated by **Walter Lynch** of Frederic B Stevens Inc.

B. J. Gaffney
Secretary

PROVIDENCE-ATTLEBORO

Cole on Barrels

The regular monthly meeting of the Providence-Attleboro branch of the AES was held Monday, September 19, at 195 Angall St., Providence, R. I. President **P. B. Lonsberry** called the meeting to order at 8:30 P.M. and presented **C. Y. Knecht,** president of the Daniels Plating Barrel and Supply Co. Knecht in turn introduced **Cole,** sales representative, speaker for the evening.

Cole demonstrated two types of plating barrels, oblique and horizontal in several sizes. He pointed out the advantages of the oblique barrel as follows: the weight of the load is in the contact; there is no cover to lock; with a counter weight, no hoist is re-

quired; it can be adapted to plate washers and other flat pieces; very successful in plating needles.

The advantages of the horizontal barrel are: will plate long rods; with corrugated barrel, will handle some flat pieces successfully; can be used in large sizes; portable barrels can be used with already installed tanks.

Both types of barrels give best results when open areas of the holes are properly engineered.

A discussion of materials used brought out the fact that high temperature plexiglass is the most commonly used substance at the present time. The best quality obtainable is desirable. Teflon will withstand greater heat but price is an economic factor. Melamine in some respects has advantages over lucite but has not proved as popular.

Meeting adjourned at 9:45 P.M.

F. L. Sherman
Secretary

SOUTHERN TIER

Charter Presentation and Plant Tour

The first fall meeting of the Southern Tier branch of the AES went over with a bang! Approximately 50 members and guests toured the Scintilla Division of Bendix Aviation Corporation at Sidney, N. Y. This tour proved to be most interesting and very instructive to those who attended. Following the tour was an excellent dinner at the Sidney American Legion.

Our business meeting opened with President **Rood** calling the meeting to order at 8:40 P.M. Featured at this meeting was the Permanent Charter Presentation to our president, **L. Rood,** and our past president, **G. Zurenda,** by **P. Peter Kovatis,** executive secretary of the AES. Peter Kovatis gave a brief report of the activities of the AES at the present time.

—Photo by V. Marian

PERMANENT CHARTER was presented to Southern Tier (N. Y.) Branch on September 20 by Executive Secretary P. P. Kovatis. Left to right: R. Wheeler, Branch Secretary; Kovatis; Branch President L. Rood; Charles Harris, Branch Vice-Pres.; and Merle Ihre, Branch Treasurer. (Absent when photo was taken: Branch Past President George Zurenda)

The meeting was then turned over to **S. Stefanski,** librarian, who introduced speaker for the evening, **William J. Mahan,** abrasive engineer of the Norton Co. Mahan, with the aid of slides, presented an interesting talk on barrel finishing with tumbling abrasives. He spoke on the features of tumbling abrasives, grit sizes, barrel finishing factors, cleaners, rust preventives, and tumbling equipment.

A question and answer period followed and the meeting was adjourned at 9:40 P.M.

Roger Wheeler
Secretary

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BRANCH NEWS

SPRINGFIELD

Maynes on Precision Barrel Finishing

The Springfield branch met Monday night, September 26, at Blake's restaurant, for the opening meeting of the 1955-56 season. There was a short business meeting, during which **Edward Mahar**, librarian, notified the members that arrangements had been completed for the October meeting, to be held at the Westover Air Force Base. The members will meet at 4 P.M., for a guided tour of some of the facilities of the Base, and then repair to the Officers Club for a social period, before enjoying a prime ribs of beef dinner.

After this announcement, the 32 members and guests present enjoyed a roast beef dinner.

Librarian Edward Mahar then introduced the speaker for the evening. **Malcolm M. Maynes,** sales engineer specializing in abrasive grain applications for Norton Abrasives of Worcester discussed "What's New in Precision Barrel Finishing," and accompanied his talk with a number of excellent color slides to emphasize several important points. After the question period, there were a number of samples and displays, for the benefit of everyone concerned. In a few words, the subject was opportune, and the speaker was appreciated by all. He did an excellent job, on a subject which had been requested by several of the members, recently. Many thanks again, Malcolm M. Maynes of Norton.

HENRY L. HEISSFELD
Secretary

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WESTERN ONTARIO

Abrasives, Buffing, Polishing

Fall sessions were resumed Friday September 16 at the usual meeting place, the William Pitt Hotel, Chatham. An almost full membership turnout for dinner assures our president **Yon Shimizu** of Sydenham Trading Co. a good year. Two speakers were on hand. **Lee Vorce** of the Behr-Manning Corp. of Detroit, Mich., spoke and showed film on "Coated Abrasives for Metal Finishing." Following Vorce, **Harold Lane** of Acme Manufacturing Co. Detroit, Mich., showed a film on "Automatic Equipment for Buffing and Polishing." This meeting featured an unusually long question and answer period indicating that the subject was timely in this area. Reports were received from delegates to the National Convention in Cleveland.

ALEX. V. CORBIT
Vice-President

WICHITA

Don Hunt on Paint

Our September 28 meeting was held at The El Charo Cafe, Wichita, Kan.

Our speaker was **Don Hunt**, general manager of the Texas division of the Andrew Brown Company. His subject was "Paint Problems from the Manufacturers' and Users' Viewpoint." The members were advised by **Ogle French**, president, that copies of the Constitution and By Laws were available to each and every member and that copies of PLATING are sent to each member and that $2.00 of their dues apply on this subscription.

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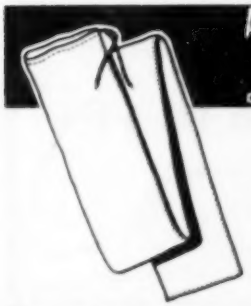

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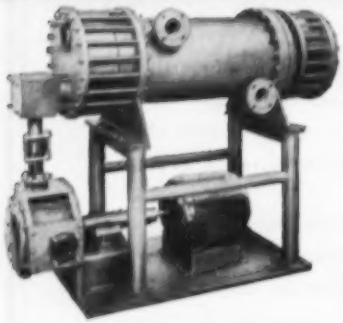

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BRANCH NEWS

Micheal and **Babst** explained the functions of the American Electroplaters' Society's affiliation with the Wichita Technical Council.

A motion was made by **Harley Babst,** of Metal Finishing Company, that **J. C. Roark** to act as advisor to students making inquiries, informing them upon questions pertaining to plating. Ogle French, president, amended the motion, that J. C. Roark act as chairman of an advisory committee set up to handle inquiries from students concerning chemicals, electroplating, etc.

Harley Babst advised of a dinner at the Allis Hotel or the Broadview Hotel and a speech on prefabricated post holes which should, according to the writer's view, be very interesting.

Hall introduced the speaker, Don Hunt, advising the members that Hunt had been in the paint manufacturing business for twenty years and initiated his entrance into the paint industry in California.

Hunt explained about cooperation needed between the user and the manufacturer and pointed to the fact that open discussions were needed to discuss their problems, not overlooking any of the consequences that may result in the solution to only one problem. The solving of one problem usually opens several more, he explained. The uses and problems of phenolics and silicones in the paint manufacturing industry were explained by Hunt and also questioned the epoxies in the paint industry. He warned of the amine-type of epoxies which can cause extreme dermatitis more serious than poison ivy.

An open discussion was held whereupon Hunt answered called inquiries and questions.

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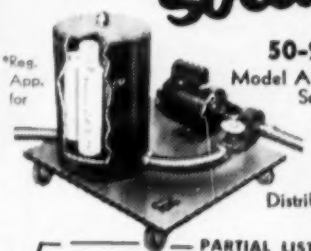
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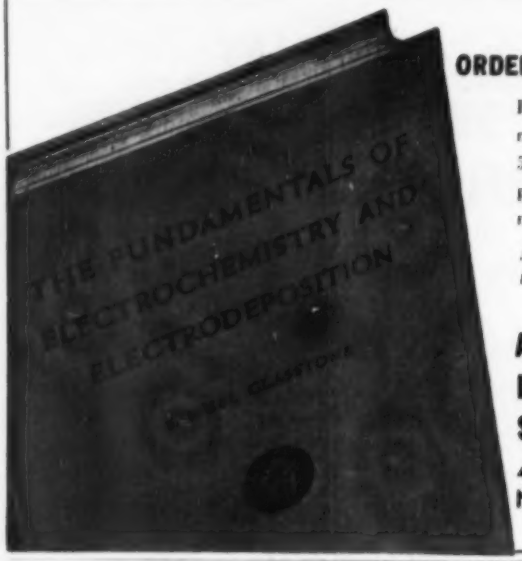

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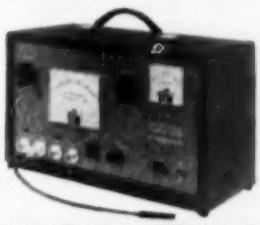

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November 13-18—ASME Diamond Jubilee Annual Meeting and Exposition of Power and Mechanical Engineering. Congress, Conrad Hilton and Blackstone Hotels, Chicago, Ill.

November 14-16—ASTM, D-20 on Plastics. Netherland Plaza, Cincinnati, Ohio.

November 16-18—ASTM, D-9 on Electrical Insulating Materials. Netherland Plaza, Cincinnati, Ohio.

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AES

November 19—Annual Educational Session and Banquet, Philadelphia Branch, AES, Hotel Benjamin Franklin, Philadelphia, Pa.

December 2—Annual Meeting, Detroit Branch, AES, Hotel Statler, Detroit, Mich.

December 2—AES Research Committee Meeting, Hotel Statler, Detroit, Mich.

December 16—Annual Meeting, Newark Branch, AES, Hotel Robert Treat, Newark, N. J.

January 27, 1956—Editorial Board Meeting, Conrad Hilton Hotel, Chicago, Ill.

February 10-11, 1956—Annual Meeting, Educational Session and Banquet, Southeastern Branch, AES, Biltmore Hotel, Atlanta, Ga.

March 10, 1956—Third Annual Tri-State Regional Meeting, AES, Hotel Biltmore, Dayton, Ohio.

April 7, 1956—New England Regional Meeting, AES, Hotel Statler, Hartford, Conn.

April 14, 1956—2nd Annual Empire State Regional Meeting, AES, Hotel Statler, Buffalo, N. Y.

June 17-21, 1956—43rd Annual Convention of the American Electroplaters' Society, Hotel Statler, Washington, D. C.

June 17-20, 1957—44th Annual Convention of the American Electroplaters' Society, Sheridan-Mt. Royal Hotel, Montreal, Canada.

May 19-22, 1958—45th Annual Convention of the American Electroplaters' Society, Sheraton-Gibson Hotel, Cincinnati, Ohio.

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